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Battle Staff Training System in Support of Force XXI Training Program: Methodology and Lessons Learned

**Charles R. Andre, Richard L. Wampler, and George W. Olney
BDM Federal, Inc.**

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Research Report 1715

**Battle Staff Training System in Support of
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Methodology and Lessons Learned**

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FOREWORD

This report documents the methodology and lessons learned in the development of the Innovative Tools and Techniques for Brigade and Below Staff Training - Battle Staff Training System (ITTBBST-BSTS). The ITTBBST-BSTS was developed as part of the U.S. Army Research Institute for the Behavioral and Social Sciences' ongoing research for the Force XXI Training Program to establish innovative methodologies for training combined arms forces. It was designed to address an identified weakness in brigade and battalion battle staff synchronization of battlefield operating systems.

The ITTBBST-BSTS trains selected staff officers and commanders in current Army battlefield doctrine, allows them to practice using that doctrine within a combat scenario environment, and records their performance for analysis and improvement. The 28 training support packages (TSPs) in ITTBBST-BSTS enable officers to gain a good basic grounding in their own staff position and cross train in others as well. This will better prepare the officers to perform as effective combat team members.

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BATTLE STAFF TRAINING SYSTEM IN SUPPORT OF FORCE XXI TRAINING PROGRAM: METHODOLOGY AND LESSONS LEARNED

EXECUTIVE SUMMARY

Research Requirement:

The Army needs structured training support packages (TSPs) to support training and assessment of individual commanders and staffs at armored and mechanized infantry battalion and brigade headquarters. Evaluation of training reveals that most brigade and battalion staffs exhibit shortcomings in basic staff skills required to prepare and conduct successful operations at the National Training Center (NTC). Although some criticize brigade and battalion commanders for making excuses for poor performance at the NTC, many hindrances to training -- such as a lack of training tools or resources -- do detract from the sort of training that would develop an effective warfighting team from a brigade or battalion staff.

Procedure:

Innovative Tools and Techniques for Brigade and Below Staff Training - Battle Staff Training System (ITTBBST-BSTS) was developed through the use of the Systems Approach to Training (SAT) process as applied to the design and development of multimedia computer-based instruction (CBI) and text lessons. The SAT cycle is a five-step loop of analysis, design, development, implementation, and evaluation.

Each job was analyzed in light of the tasks required of the incumbent in the performance of warfighting duties. The jobs analyzed were the key battalion and brigade battle staff positions, including commanders. To these 26 positions was added a common core of critical warfighting skills required by all commanders and the members of their respective staffs. The analysis included a review of previous BSTS job analyses, review of applicable doctrinal publications, review of lessons learned available from published material or military subject matter experts (SMEs), and review and approval by the customer.

The design process used the results of the job analyses to determine tasks, identify which ones were critical, produce instructional objectives, develop criteria test items, prepare course maps, develop course strategies, and prepare examinations. Formative evaluation was initiated early in the design phase and continued throughout development. Development of course material was based on the analysis and design completed by the research team. Prototypical TSPs contained, not only instructional material, but a comprehensive assessment component (COMPS) and remediation training (when evaluated as necessary). ITTBBST-BSTS also included a User's Guide and a System Administrator's Guide. The prototype courses were implemented on a trial basis through SME and target audience testing at Fort Knox, KY. Results of testing were used to revise each TSP.

Findings:

Based on evaluation of target audience tester comments, staff officers are receptive to new training techniques. Based on tester ratings, CBI and text lessons were preferred over reading doctrinal references. Target audience representatives showed a marked improvement in their job knowledge and how to synchronize battlefield operating systems after completion of the appropriate TSP(s) as evidenced by test score improvement between pre and post testing. ITTBBS-BSTS appears to be a valid tool for addressing training weaknesses within the battalion and brigade staff of an armored or mechanized infantry unit.

Utilization of Findings:

This report describes the development of ITTBBS-BSTS and the lessons learned during the process. ITTBBS-BSTS has shown itself to be effective in improving staff officer skills and knowledge in individual tasks as well as battlefield synchronization principles. The CBI method of instruction received high value ratings from target audience testers and would appear to lend itself to further development and expansion as a method of individual officer training.

BATTLE STAFF TRAINING SYSTEM IN SUPPORT OF FORCE XXI TRAINING
PROGRAM: METHODOLOGY AND LESSONS LEARNED

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BATTLE STAFF TRAINING SYSTEM IN SUPPORT OF FORCE XXI TRAINING PROGRAM: METHODOLOGY AND LESSONS LEARNED

INTRODUCTION

The U.S. Army Research Institute for the Behavioral and Social Sciences (ARI) has conducted research supporting the development of training strategies for brigade and battalion level combined arms combat teams, crews or staff groups, and individuals. This is a major focus of the Force XXI Training Program (FXXITP), a program designed to carry the Army's training capabilities into the 21st century (U.S. Army Training and Doctrine Command (TRADOC), 1994).

In support of FXXITP, ARI initiated the Innovative Tools and Techniques for Brigade and Below Staff Training (ITTBBST) program. Using a doctrinally-based performance taxonomy, a key ITTBBST thrust was analyzing Battlefield Functions (BFs) to establish a common basis for structuring individual and unit training programs. At the next level, paper-based and multimedia computer-based instruction (CBI) in the form of Battle Staff Training System (BSTS) courses were developed to train individual staff members on skills required for various staff functions. Capitalizing on advanced workstation technology, the last level of this program involved development of an innovative tool for training small groups of staff officers in the Staff Group Trainer (SGT). The SGT serves as a bridge between individual staff training provided by the BSTS and training exercises designed for the integrated staff.

Prior to collective training, staff officers must master individual staff skills and their role in synchronization of battlefield operating systems. The tool developed for this training is BSTS. This report provides methodology and lessons learned in preparing BSTS courses for use in the FXXITP through the ITTBBST-BSTS project.

The ITTBBST-BSTS is a combination of text and CBI composed of two sets of functional area training packages for battalion and brigade level staff officers. The packages include computer-based materials, text-based instruction and a training management system. The ITTBBST-BSTS was developed for use by the total force, Active and Reserve, and designed for use in a local area network, wide area network, or stand alone computer mode. The work was performed by BDM Federal, Inc., from January 1996 through May 1997 under contract to the ARI Armored Forces Research Unit.

Background

The U.S. Army currently faces the challenge of meeting complex, highly diverse training requirements with increasingly constrained resources (Brown, 1994). Resource constraints result from increased costs of acquiring and operating advanced technology weapon systems, accompanied by force downsizing and shrinking defense budgets. To meet the challenge of doing more with less, Army trainers have begun to develop innovative techniques for assisting units in achieving their training goals.

Training research conducted by ARI forms the foundation upon which the FXXITP is being built, addressing maneuver element and staff training at the individual, crew/group, and unit levels. Much of the ARI work centers around simulation-based training programs established for the Reserve and Active Components (e.g., C. H. Campbell, R. C. Campbell, Sanders, Flynn, & Myers, 1995), accomplished by the Armored Forces Research Unit at Fort Knox. Work on battle staff training using these programs was conducted at the Infantry Forces Research Unit at Fort Benning. In parallel, the Unit Collective Training Research Unit at the Presidio of Monterey

performed a large body of research on BF's (e.g., Harrison, 1995), formerly known as Critical Combat Functions (CCFs).

The Force XXI Training Development (TD) Vision (U.S. Army Training and Doctrine Command, 1995) states the Army's TD process is the Systems Approach to Training (SAT), conducted at training/task proponent schools that results in collective, individual (WARRIOR), and Army modernization training products. "The mission of WARRIOR XXI program is to provide a future architecture for the development of training products and policies to support the total spectrum of training." (U.S. Army Training and Doctrine Command, 1996). Within the WARRIOR XXI training/TD vision, BSTS is a key development program to implement the following subcomponents:

1. Distance Learning: A concept for the delivery of training to the soldier, when and where needed. Use of extensive worldwide corporate and government electronic networks provides a range of capabilities for distributing learning in either a synchronous/real time or asynchronous mode from simple text transmissions to video teleconferencing. It allows the soldier to use a modem and standard communications software to dial into the Army Training Support Center (ATSC) Bulletin Board Service (BBS) from any location, 24 hours a day.

2. Diagnostics: An automation tool which allows both soldiers and trainers to objectively evaluate current and historical performance against standardized criteria, using stated objectives.

Evaluation of brigades and battalions at the National Training Center (NTC) reveals that brigade commanders, battalion commanders, and staff officers at both levels exhibit serious deficiencies in synchronizing the battle (Rosenberger, 1995). Coordination and integration of all the elements of combat power available to battalion and brigade commanders has always been crucial to winning the battle. Technology has made weapons more accurate and lethal than a decade ago; requiring, not only coordination and integration, but more precise teamwork among the combined arms elements. Synchronization, the weak spot, includes coordination and integration, and brings the fourth dimension of the battlefield -- time -- sharply into focus. Never before has teamwork been so crucial to success. Commanders and staff officers must fight the battle as an active, synchronized whole.

The ITTBST-BSTS addresses staff deficiencies at the individual task level. It provides a means for brigade and battalion commanders and their staffs to gain essential knowledge, enabling them to perform their critical command, control, communications, and synchronization tasks. Successful performance of these tasks lets them feel the battlefield and improve their preparedness for participation in collective training.

Maneuver Training Packages

ARI's development of implementation packages to support training of maneuver elements centered on the use of SIMulation NETworking (SIMNET), a form of virtual simulation. Using SIMNET capabilities, the Simulation-based Multiechelon Training Program for Armor Units (SIMUTA) developed structured training exercises for a variety of units. These included armor battalions/task forces (TFs), armor companies/teams, armor platoons, cavalry troops, mechanized infantry platoons, and scout platoons (Campbell et al., 1995). Scenarios and training support packages (TSPs) for two missions--movement to contact (MTC) and defend in sector (DIS)--were developed initially for execution by Reserve Components. Follow-on research extended the training packages to a deliberate attack (DATK) mission. The ground-breaking SIMUTA work established a library of TSPs organized in an efficient "turn-key" system which makes the most of the training schedules available to Reserve units. The ARI team extended the training library to the Active units in the Combined Arms Operations at Brigade Level, Realistically Achieved through Simulation (COBRAS) program (The COBRAS Team, 1995). The methodology and

lessons learned from the SIMUTA and COBRAS efforts (Hoffman, Graves, Koger, Flynn, & Sever, 1995) provide a foundation for future expansion of simulation-based maneuver training, including valuable techniques for integrating exercises across echelons. As a lead-in for these collective TSPs, ITTBBS-BSTS uses the same operational scenarios to drive practical exercises, to identify synchronization requirements and as the foundation for the end of course comprehensive exams. This commonality is intended to facilitate the transition from individual to collective training.

Individual Staff Training Packages

For individual staff training, the BSTS at brigade (BDE-BSTS) (André & Salter, 1996a) and battalion (BN-BSTS) (André & Salter, 1995) uses text-based and multimedia CBI methods to train individual staff members on skills required for various staff functions. A library of courses covers a variety of staff positions and can be used by officers at home, school, and armory. Currently developed and distributed modules encompass twelve courses for battalion staff members (BN-BSTS), and twelve courses for brigade staff members (BDE-BSTS) with a separate common core course for both the battalion and brigade level. Figure 1 presents the course/lesson flow for ITTBBS-BSTS courses, using both text and CBI instruction. Within BN/BDE-BSTS when instruction included complex tasks requiring coordination, synchronization, or a practical application of the skills and knowledge being presented, CBI was selected as the presentation methodology.

The design of the course and lessons allows the student to control the sequence and pace of the training. An introduction is provided at the beginning of each subject and the student can select whether or not he or she wants to complete the course for credit. If "credit" is selected the student must take a pretest to determine starting knowledge. If "credit" is not selected, a student will not take a pretest, and will not be allowed to take the lesson exams. The student is then able to choose the desired lesson. Students start lessons by reviewing the introduction contained in CBI. Where appropriate, the student is referred to the Student Workbook which provides the tasks, conditions, standards and performance measures for the lesson, as well as a list of required reading if the student is not well versed in doctrine for this material. Following off-line reading, which includes text-based lesson material, the student returns to CBI to complete practical exercises, study tutorials, and complete the lesson exam. Cues are integrated throughout the instructional material to guide the student between text and CBI material. Various navigation choices and options are available to the student in the CBI material that allow individuals to move as quickly as desired and replay information as needed. If a student passes a lesson exam, the information is recorded and the student selects another lesson. In the event of a failing score, the information is recorded and the student is prompted to restudy the material. For selected lessons, remediation training modules are included in CBI and would be available to the student. After further study the student should retake the lesson exam.

ITTBBS-BSTS courses are composed of subjects; subjects consist of groups of lessons, and lessons are composed of topics that cover a major learning objective. Lessons normally take one to two hours to complete for an officer of average ability. The training management system developed for the BSTS, Environment for MultiMedia interactive instruction (EMMii), allows the trainer or other designated individual in the unit or school to monitor the progress of individual battle staff officers as they proceed through the courses of instruction and attain mastery of their individual skills and knowledge. All diagnostics, performance measurements, and feedback are captured in the EMMii data base, enabling student progress and status reports to be provided to the trainer. Instruction on mastery of basic skills and knowledge is followed by scenario-based application of critical tasks in the Comprehensive Assessment Component (COMPS) to ensure the student can apply teaching points in a realistic environment.

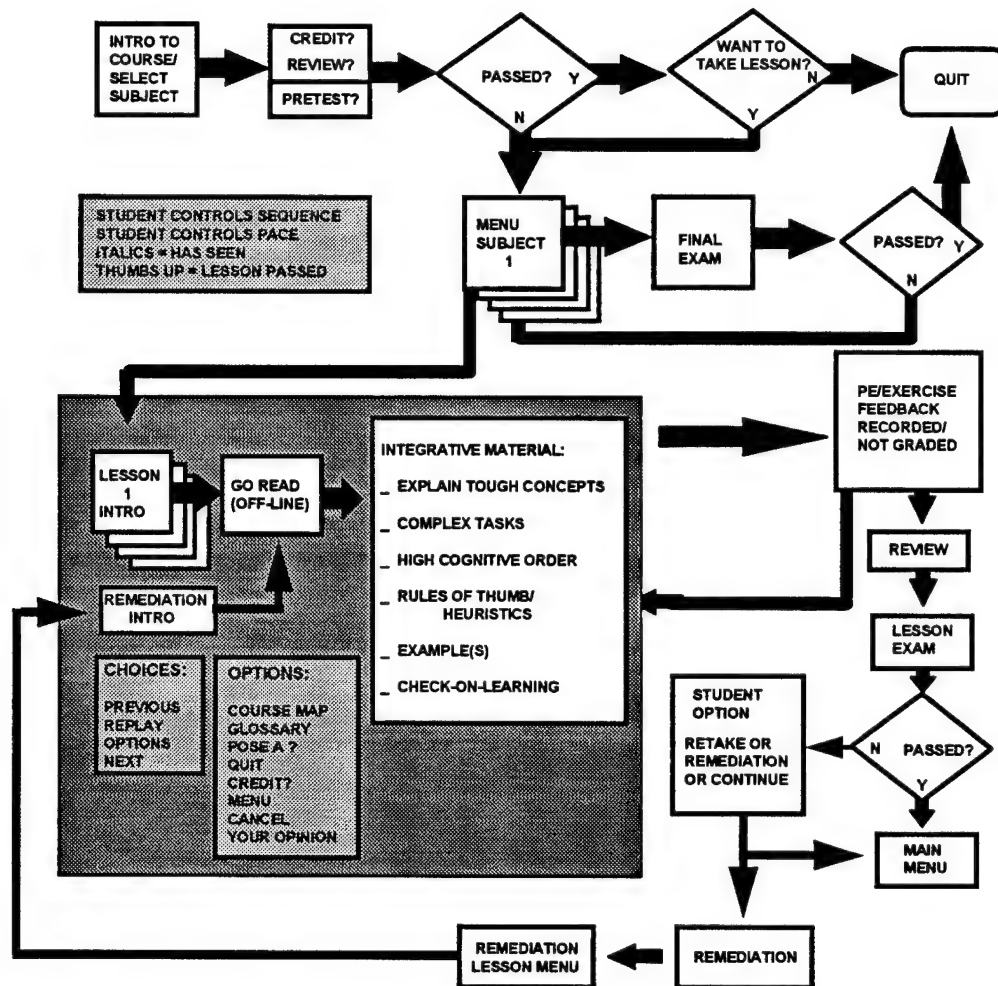


Figure 1. Course/lesson flow.

Doctrinally-Based Performance Taxonomy

Given the task-driven nature of Army training, tools for identifying, structuring, and organizing tasks critical to combat effectiveness are essential. In a major ongoing effort, ARI is analyzing BFs to establish a common basis for structuring unit training programs and assessing unit performance (e.g., Harrison, 1995). The Army's Battlefield Operating Systems (BOS)¹ established in the Blueprint of the Battlefield (U.S. Army Training and Doctrine Command, 1991) provide the basic structure for the BFs.

Analysis has resulted in a detailed inventory of the components necessary to guide planning of training exercises and assess unit performance. Extensive task analyses of BFs have been completed at the battalion task force (TF) level and the brigade level. In addition, task

¹ "Battlefield Operating System" is being replaced by "the Army Unit Training List (AUTL)." This report uses BOS to more clearly relay an understood intent until the terminology issue is resolved.

analysis of fire support coordination, integration and synchronization at levels from brigade through corps has been performed.

The BF task analyses are a valuable tool for ensuring consistency across related training development efforts. They provide common structure intended to facilitate the design and implementation of TSPs at multiple echelons. The methodology supports the determination of linkages and dependencies across functional elements of a brigade or battalion. Results help define objective measures of performance based on observable behavioral outcomes (Kemper, 1995). In short, BF task analyses provide a basis for integrating training developments addressed in ITTBST-BSTS and establishing consistent approaches to the measurement of performance.

Value of CBI

In his article, *Advanced Technologies Applied to Training Design: What Have We Learned About Computer Based Instruction in Military Training?*, Fletcher presents a summary of some research efforts. "Dana (1987) reported reductions from 40 percent to 10 percent in washback rates, earlier screening of student suitability for training, and 1-2 week reductions in training time. Yasutake (1987) reported 24 percent to 35 percent time savings for four courses, positive (80-90%) student attitudes, and negative instructor attitudes for computer managed instruction. Noja (1987) reported reductions in training time from 8 to 5 weeks, equivalent student achievement for electronic theory and improved student achievement for electronic applications. In comparing results from a computerized, hand-held training aid with text-based workbooks, Wisher (1987) reported more course completions (91% as contrasted with 58%) and better test performance by a ratio of 2:1 for the computerized training aid. Noja (1991) reported 30 percent to 50 percent reductions in training time and per student per year savings of \$5,500 for CBI." (Fletcher, 1995)

Much of the value of CBI to military trainers lies in the areas of student interest and resource management. Student interest is reflected by the studies referenced above. Resource management, on the other hand, involves two areas of concern to a military trainer: scheduling time and overhead costs. Because CBI is essentially a self-paced and independent study vehicle, it automatically reduces the scheduling/conflict resolution requirements inherent in classroom and learning center training. In addition, costs and time lost in instructor and student travel are either reduced or negated, dependent on the method of CBI employed.

Statement of the Problem

While individual staff skills are taught in TRADOC schools, individual staff roles and functions in battlefield synchronization is not emphasized. The problem addressed by ITTBST-BSTS concerns the need for multimedia TSPs to support assessment and individual training of commanders and staffs at armored and mechanized infantry battalion and brigade headquarters to hone individual skills prior to collective training.

Evaluation of training reveals that most command post exercises, vehicles for staff individual training as well as staff group training, are of short duration and not driven by scenarios sufficient to prepare brigade and battalion staffs or commanders, as individuals, for operations at the NTC. Although Rosenberger (1995) and others, such as Battle Command Battle Laboratory and Center for Army Lessons Learned publications, criticize brigade and battalion commanders for making excuses for poor performance at the NTC, many hindrances to training cited by commanders do in fact exist, and do detract from the sort of training that would develop an effective warfighting team from a brigade or battalion staff.

BSTS Training Program Foundation Documents

The *Commander's Battle Staff Handbook* (Pleban, Thompson, & Valentine, 1993) was published by the Infantry Forces Research Unit, ARI, Fort Benning, Georgia. Linking individual tasks to collective tasks, it also serves to smooth the transition between individual tasks. It contains current information on the missions, functions, and techniques used by the commander and staff at the battalion level.

The *Brigade Commander's Battle Staff Handbook* (André & Valentine, 1996) was published by the Infantry Forces Research Unit, ARI, Fort Benning, Georgia. This book serves the same function as the *Commander's Battle Staff Handbook*, but at the brigade level. It contains current information on the missions, functions, and techniques used by the brigade commander and staff.

The recent update of TRADOC Regulation 350-70, *Training Development Management, Processes, and Products* (U.S. Army Training and Doctrine Command, 1995), was used as the guide to SAT in the analysis, design, development, implementation and evaluation of the ITTBST-BSTS project. It includes the processes and products involved in, and resulting from, the front end analysis (FEA) as well as all five phases of the SAT process.

The latest draft of TRADOC Pamphlet 350-70-2, *Multimedia Courseware Development Guide* (U.S. Army Training and Doctrine Command, 1996), provides guidance for producing multimedia courseware. It describes how to plan, design, develop, and validate multimedia courseware. As a draft document, this was used as a general guide throughout this project.

Preparing Instructional Objectives (Mager, 1975) provided the framework for the construction of training objectives. The structure of the training objective also pointed directly to, and supported the construction of, criteria test items by which successful performance could be determined. Mager insisted that a clear understanding of where the student is going, in terms of goals and performances, was essential to the accomplishment of instructional aims.

Rosenberger (1995) highlighted numerous shortcomings in battalion and brigade command and staff work at the NTC. He identified a lack of synchronization as the cause of many failed attacks, attributing many of the defeats to the commander and staff officers' failure to realize what was happening on the battlefield. His observations, and those of others, contributed to the needs assessment which was a vital part of the FEA.

Key to the development of the required TSPs was the review and application of current doctrinal and training publications in the form of field manuals (FMs). The complete reference list used in the development of ITTBST-BSTS is at Appendix A. Also see Appendix F, Review of Related Research.

Technical Objective

To develop and formatively evaluate BSTS-based brigade/battalion commander training courses, to include COMPS and required remediation; enhance existing brigade/battalion staff officer training courses with COMPS and necessary remediation components; update the orders and doctrine; and formatively evaluate the updated courses of instruction.

Scope of the Project

In accordance with the Army's crawl-walk-run model of training, maneuver unit training begins at the individual level, progresses through crew, platoon, and company levels, then culminates in battalion maneuver exercises (Department of the Army, 1988, 1990). As the level of training increases, both realism and complexity increase, leading to the ultimate training exercise at one of the Army's Combat Training Centers (CTCs).

Individual training of commanders and staff officers follows the Army model. The first step (crawl) is to teach individual staff and command skills. The ITTBBS-TBSTS project was initiated to deliver 28 prototype multimedia individual-oriented TSPs for training the brigade and battalion commanders and staffs of the armored force (Table 1). Supporting the TSPs was the delivery of the student guide, trainer's guide and EMMii to create a complete training system that can be implemented by the Force XXI Training Program in the total force.

Table 1

ITTBBS-TBSTS Training Support Packages

Brigade	Battalion
1. COMMANDER	15. COMMANDER
2. EXECUTIVE OFFICER (XO)	16. XO
3. S1/CHAPLAIN	17. S1
4. S2	18. S2
5. S3	19. S3
6. S4	20. S4
7. S5	21. S3 AIR
8. S3 AIR	22. CHEMA
9. CHEMICAL OFFICER (CHEM)	23. SGO
10. SIGNAL OFFICER (SGO)	24. FSO
11. FIRE SUPPORT OFFICER (FSO)	25. ENGINEER (ENG)
12. ASSISTANT BRIGADE ENGINEER	26. CHAPLAIN
13. AIR DEFENSE OFFICER (ADO)	27. ADO
14. COMMON CORE	28. COMMON CORE

Organization of the Report

The remainder of this research report contains the following sections:

The BSTS Development Methodology - A detailed description of the development process for ITTBBS-TBSTS, including an overview, a discussion of the FEA, and an in-depth examination of the development of new courses.

Formative Evaluation - Both updated and new courses went through a formative evaluation (FE) process. This section discusses the design of the FE process, testing procedures, and revisions of the TSPs derived from evaluations.

Discussion - This section examines the uses of ITTBBS-TBSTS courses, as well as implementation considerations.

Lessons Learned - The lessons learned in the preparation and update of BSTS courses are examined in this section, including program design, development methods, and FE procedures.

Conclusions and Recommendations - Points covered in this section concern conclusions made as a result of the program and recommendations for future research and development.

BSTS DEVELOPMENT METHODOLOGY

Project Overview

The need for individual training for armored and mechanized infantry battalion and brigade commanders and their staffs set the stage for this project. ITTBBS-TBSTS was developed by applying the SAT process (Figure 2) to the design and development of multimedia CBI and text lessons. The SAT cycle is a five step loop of analysis, design, development, implementation, and evaluation.

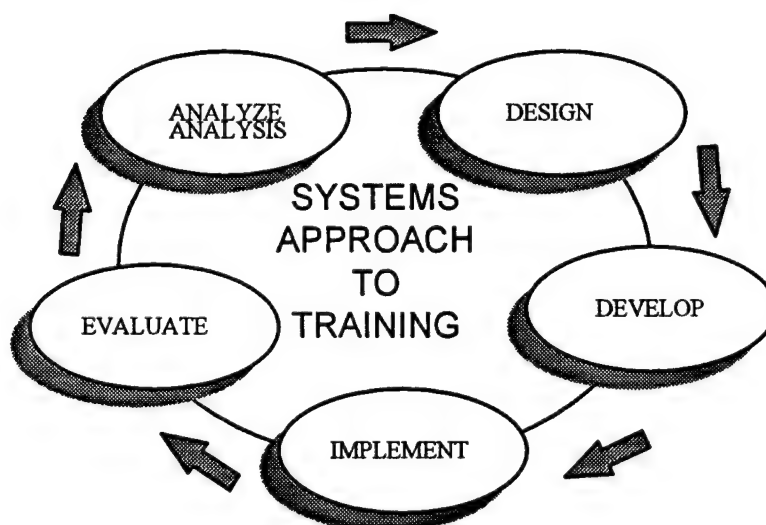


Figure 2. SAT model.

Analyze

The initial step of the SAT cycle is analysis. TRADOC Regulation 350-70 defines analysis (the FEA) in terms of the job analysis. Figure 3 depicts the BSTS analysis and design model. The FEA done for ITTBBS-TBSTS is consistent with this definition, and each job was analyzed in light of the tasks required of the incumbent in the performance of their warfighting duties. The jobs analyzed, as directed in the Statement of Work (SOW), were the key battalion and brigade battle staff positions, including commanders. To these 26 positions was added a common core of critical warfighting skills required by all commanders and the members of their respective staffs. Therefore, the analysis resulted in the design and development of 28 prototype courses (Table 1) of instruction. The intended (target) population was the total force, Active and Reserve.

The analysis included a review of the existing BN- and BDE-BSTS Program Design/Critical Tasks (Andre & Salter, 1996 b and c respectively), BFs, review of applicable doctrinal publications, review of the Center for Army Lessons Learned (CALL) publications, interviews with TRADOC SMEs, interviews with and reviews of the output by current and past

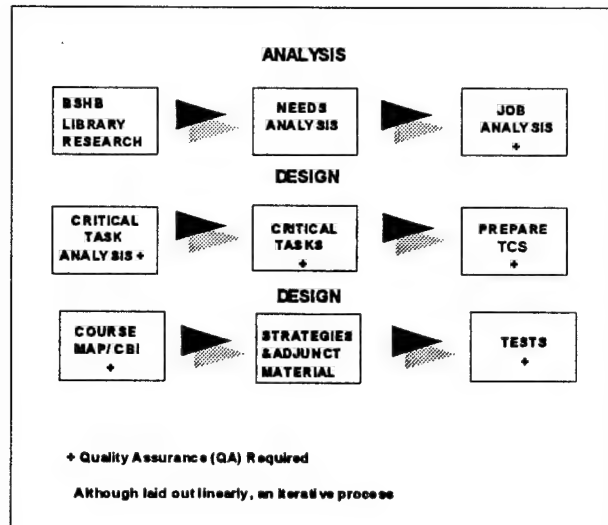


Figure 3. BSTS analysis and design model.

observer/controllers (O/Cs) at the CTCs, and review and approval by the contracting officer's representative (COR). The BFs served as a litmus test for individual critical staff functions at battalion and brigade level; each function was analyzed to ensure that the requisite individual staff skills were included in course material. Battalion and brigade FEAs used the output of the available BF task analyses to ensure that critical tasks had been included in the courses. This served to help unify and integrate BF task analyses with BSTS. The resulting job analysis led to the next phase of SAT, design.

Design

The design process used the results of the FEA to determine the tasks; identify which ones were critical; produce tasks, conditions, and standards (TCS); develop criteria test items; prepare course maps; develop course strategies, and prepare examinations. The critical task list and draft course map were reviewed by the Operations Group of the NTC, TRADOC SMEs, and (in the case of the two commander's courses) Battle Command Battle Laboratory (BCBL). The BSTS FEA output was provided to the SGT project team for similar review. The process, illustrated in Figure 3, appears to be linear; however, like SAT, it is iterative. Formative evaluation was initiated early in the design phase, and continued throughout the life of the courses.

Develop

The third step in the development of the 28 BSTS TSPs was creation of course material. This process (Figure 4) was based on the analysis and design completed by the research team. Input to the development of TSPs was composed of the FEA, specific training objectives, and course map. During the conduct of this phase of the development methodology, both the text-based instruction and the storyboards (including the practical exercises (PEs) and exams as well as the audio visual (AV) material) that lead to the development of the CBI were created by Contractor Military Experts (CMEs) and graphic artists. Following the development of text and CBI, a quality assurance (QA) review was completed by the BSTS team.

Commercial off-the-shelf (COTS) tools and templates compatible with both the BN-BSTS and BDE-BSTS courses were used in ITTBST-BSTS CBI development. Templates helped define learning strategies for mastery of skills and knowledge, techniques for question and answer sessions, testing criteria, screen design, navigation through courses of instruction, helps, job aids, and screen layout.

CBI authoring was accomplished using *Icon Author*^{TM 2} software, assuring compatibility with all BSTS program courseware. *Icon Author* is COTS software; therefore, the source code of BSTS courseware is available to anyone to whom the government chooses to provide it. The authoring process for the project included the general application of templates developed for previous BSTS

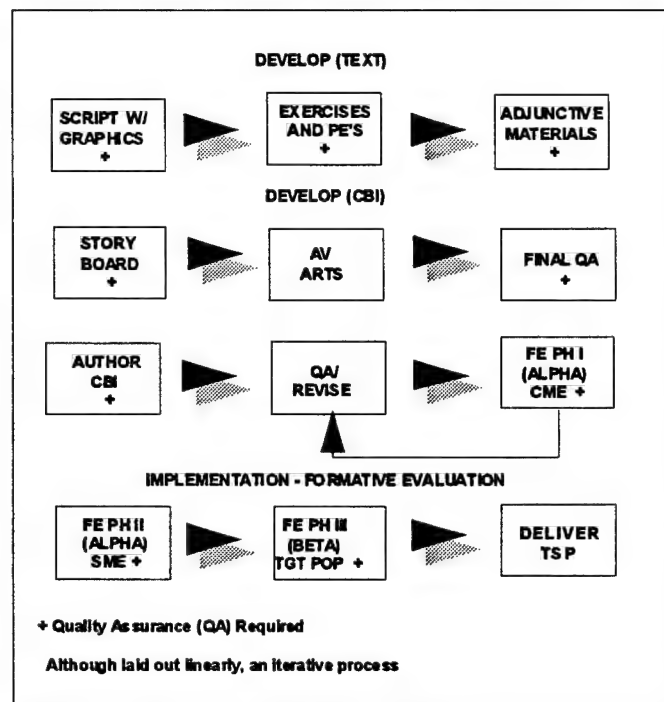


Figure 4. BSTS development model.

programs and the development of new templates that included the requirements for COMPS, remediation, and security of COMPS.

The development of BSTS courses was executed in three parallel tasks:

1. Development of the battalion and brigade commanders' BSTS courses, with COMPS and remediation.
2. Development of the COMPS for all courses.
3. Enhancement of the courses through the application of updated tactical doctrine. This was supplemented with new tactics, techniques and procedures (TTPs), and lessons learned gleaned from recent Army publications (e.g. Center for Army Lessons Learned documents) as

² *Icon Author* Version 7.0, November, 1995. A trademark of AimTech Corporation, 20 Trafalgar Square, Nashua, NH 03063.

well as feedback from formative evaluation by TRADOC SMEs. This also included modification of existing practical exercises to align with Simulation-Based Mounted Brigade Training (SIMBART) standard operation orders. Development of remediation for revised courses was done as required.

Implement

Implementation on a trial basis was executed at the BSTS developmental laboratory at Skidgel Hall, Fort Knox, Kentucky. Phase II Alpha participants (SMEs) and Phase III Beta participants (target population officers) were selected, briefed and then issued prototype versions of the material a normal student would receive when taking an ITTBBS-BSTS course. These participants provided feedback and demographic data that was returned to course developers for evaluation.

Evaluate

Because of the nature of the ITTBBS-BSTS project, implementation and evaluation were so closely interrelated that implementation overlapped with evaluation. Results were evaluated to determine the efficiency and effectiveness of the training products in attaining the goal of training battalion commanders, brigade commanders, and their respective battle staffs in individual staff and command skills. The FE was conducted in three phases, that included:

Phase I - Alpha testing by CMEs

Phase II - Alpha testing of the complete (draft) training support package (TSP) by military SMEs at Fort Knox. (This included at least one tester for each course. Testers had usually served in the staff position for the course they were evaluating, had participated in actual combat and/or CTC rotations, and most were currently assigned as instructors at TRADOC schools.)

Phase III - Beta testing of the complete (draft) TSP by target population officers at Fort Knox. (This included two to five testers for each course. Most testers had completed an assignment as a battalion or brigade staff officer; were captains, majors, or lieutenant colonels; and were branch qualified for schooling.)

Phase II-III FE lesson/subject examination results determined the necessity for remediation lessons.

A fourth phase was added to the FE process, review of the TSP by a COR representative. Phase IV FE was added at the request of the COR and conducted by government representatives at Fort Knox.

FEA for ITTBBS-BSTS

The FEA was a top-down process that provided the foundation for the design of training. The FEA yielded the answers to eight important questions. These questions were: Who is to be trained? What are they to be trained to do? When are they to be trained? Where are they to be trained? How are they to be trained? Why are they to be trained? How well must they be trained? By whom will they be trained?

During FEA, the tasks identified for inclusion in the ITTBBS-BSTS were derived from those listed in the program design/critical tasks developed for the BN-BSTS (Andre & Salter, 1995) and BDE-BSTS (Andre & Salter, 1996). A terminal learning objective was prepared for each course, then individual tasks in the form of TCS were compiled into lessons. Battalion level

tasks fell out of the brigade tasks; in many cases they were identical as a result of the top-down process.

Use of Battlefield Functions as Underpinnings of FEA

The FEA was the application of the analysis step of the SAT process to ITTBBS-BSTS. It included review of literature applicable to the development of BSTS, external input requirements to the analysis, training requirements, and training need.

The intention of the FEA was twofold. The initial analysis was a job analysis (as described in TRADOC Regulation 350-70) to determine individual tasks in which to train staff officers. The FEA then progressed to identification of the interfaces used by a commander or staff officer to integrate individual tasks and BOS responsibilities with other staff members, producing a team. This progression from individual job to staff integration is analogous to the relationship between BF's and BOSs, wherein the 39 BF's are combined in subgroups of tasks required to proficiently utilize the 7 BOSs.

The foundation of the FEA for ITTBBS-BSTS was the FEA from BN-BSTS and BDE-BSTS. Current Army doctrine, CTC lessons learned, and doctrine-related publications were utilized as primary material to update the FEA. Additional input came from analysis of BF's 18 (Plan for Combat Operations), 19 (Direct and Lead Unit During Battle Preparation), and 20 (Direct and Lead Units in the Execution of Battle). These BF's were incorporated into the foundation of the commanders' courses and used in the update of existing courses.

The BF's were cross-referenced with the original framework of BSTS. Because BF's and BSTS had common antecedents, there was almost total agreement. Terminal learning objectives and TCS were refined based on this review so as to align closely with BF's.

Update of Existing TCS/Courses

In each course the student is taken through the crawl-walk-run model of training. Students begin with specific performance measures, proceed through the terminal learning objective of each lesson, and emerge with an understanding of the BOSs and their integration. As stated earlier, terminal learning objectives for ITTBBS-BSTS courses, as well as TCS for lessons, can be directly linked to each of the BF's. This means that, at a more basic level, TCS required to meet the terminal learning objective can also be viewed as leading towards the successful performance of the BF's. Since TCS identify the skills the individual staff member must master, to include the synchronization of those skills with the unit commander and the rest of the staff, ITTBBS-BSTS is a viable vehicle to address the battlefield synchronization problems identified by Rosenberger (1995) and others.

TCS were updated through use of the new generation of publications emerging since the publication of FM 100-5 (Department of the Army, 1993). The methodology for TCS update was specified in the ITTBBS Design Document (BDM Federal, Inc., 1996). On review of current and emerging doctrine, TCS were selected for update and other tasks were identified as required to be trained. Updates were prepared, or new TCS created. Text and CBI lessons were then modified or developed. All lessons were rewritten to incorporate the latest doctrinal material.

Creation of TCS for Battalion and Brigade Commanders

Professional competence of the commander is characterized in FM 100-5 as a significant part of any unit's combat power. In the pamphlet *A commander's guide for the coordination and employment of battlefield operating systems*, the BCBL reported that battle commanders did not

have a general level of battle command competencies (Battle Command Battle Laboratory, 1995). As a direct result of the FEA methodology discussed above, ITTBBST-BSTS courses were identified as necessary for commanders at battalion and brigade levels, something lacking from previous versions of BSTS. Utilizing the steps delineated in Table 5 of the ITTBBST Design Document (BDM Federal, Inc., 1996), both courses were created using the findings contained in the BCBL *Commander's Guide*.

The TCS were designed to provide basic instruction in the essential elements of a commander's professional knowledge. They identified and provided a framework for lessons in the decision making process, the components of battle command and control (C²), the functions of each of the commander's primary staff members, combat support, and combat service support. In essence, the commander's courses were designed to provide basic instruction on the BOSs and their synchronization.

Doctrinal Updates to BN/BDE-BSTS

FM 100-5, Operations (Department of the Army, 1993), was written to reflect Army thinking in an era where the strategic equation has radically changed from that of only a decade earlier. Its genesis was the fact that the Cold War was over, thus the nature of the strategic threat was radically different, requiring reexamination of doctrinal solutions to that threat. The new edition of FM 100-5 spawned a series of doctrinal publications to develop branch-specific aspects of Army doctrine, all intended as capstone manuals implementing FM 100-5. In addition, BCBL publications and Student Text 101-5 (U. S. Army Command and General Staff College, 1995) identified and addressed shortfalls in battle command competencies and the decision making process.

The new publications were utilized in the doctrinal review that updated BN/BDE BSTS and created ITTBBST-BSTS. The BCBL *Commander's Guide*, FM 71-3, and FM 100-5 served as the focus documents for course development. As each course was developed, the source material utilized reflected the branch-specific adaptations of new doctrine. Where lessons were more general, FM 100-5 itself served as the basis. Throughout, the BCBL *Commander's Guide* was utilized as a framework and map of key points that the lessons were required to address.

As may be expected during a time of quickly evolving doctrinal change, inconsistencies were discovered within and between different publications addressing the same area from different viewpoints. In many cases, this was simply due to separate manuals with overlapping areas being updated over extended periods by several agencies with interrelated responsibilities. When these doctrinal inconsistencies were uncovered, most were resolved through review of the most recent publication from the TRADOC proponent. In other cases, conferring with the responsible agency and discussing the inconsistency led to a satisfactory conclusion.

The Role of SIMBART Operation Orders

Scenarios were previously used in BSTS courses to facilitate PEs. However, these scenarios were not the ones used with other TSPs. Therefore, all scenario based PEs and instructional references were updated to use the SIMBART operation orders. By design, SIMBART TSPs provided scenarios through the use of operation orders for MTC, DATK, and DIS. These orders were utilized to create scenarios in which practical exercises and COMPS were structured so as to give the student, not only a realistic feel for the BOS being taught, but an opportunity to integrate and synchronize teaching points for various BOSs examined throughout the course. This method gave the student instruction in both areas of professional competence and systematic management of the information learned.

New Courses and Course Components

Courses for the armored and mechanized infantry brigade and battalion commanders were added to the BSTS library based on the identified need for the training of these commanders in their individual warfighting tasks. Some officers are selected for command that have had a recent assignment in a non-troop unit, thus lacking in current experience. This issue, coupled with lessons learned from unit performance at the CTCs, formed the basis for the need for the commander's courses. Commander's courses were developed to be used prior to a designated commander's attendance at the Pre-Command Course, not in lieu of it. A COMPS module was added to each course to assess student knowledge at the end of the course and their ability to synchronize battlefield operating systems. A remediation component was also developed for each lesson where FE criteria showed it to be necessary.

Commander's Courses

Once the need had been identified for new courses for battalion and brigade commanders, the majority of the development process was basically the same as that utilized to update existing courses. Added to this, however, were requirements for new areas of research and analysis, not updating, of TCS and performance measures. The following paragraphs outline the detailed process used to develop these courses.

Research/FEA for Commander's Courses

Research included current doctrinal literature, proponent school doctrinal experts, the BCBL *Commander's Guide*, and CALL newsletters. When using doctrinal materials, approved or final doctrine was used, as this should be available to the training population. In some cases emerging doctrine or draft versions were used, but this fact, when applicable, was noted within the body of the training material. The proponent school provided the current status of doctrine development, along with any new equipment and its scheduled fielding plan. Other sources of information available at the proponent school included the table of organization and equipment manager and the training development section or directorate.

The components of battle command were analyzed to determine the individual competencies required of battle commanders. This included an analysis of missions, identification of tasks and subtasks, and identification of conditions under which they are performed. Command and control competencies were addressed on two levels; the global level, as terminal learning objectives, and at the individual level, as TCS.

Terminal Learning Objective (TLO) & Task Analysis

The TLO was developed as a short narrative describing the purpose of a particular course of instruction. The TLO format also listed TCS for each lesson within the course of instruction.

Performance measures were published in the instructional material to provide the student a guide for self-evaluation. Task analysis was directly linked to construction of test items.

Course Design/Outline

The SAT process (Figure 2) ensured the systematic, thorough, and orderly construction of the courses of instruction, and the continual FE of each course. The BSTS development model (Figure 4) was used to implement the SAT process in course development.

Course outlines were prepared based on the outcome of the FEA (Figure 5). The course outline often referred to as the course map, is a graphic or visual portrayal of the course of instruction.

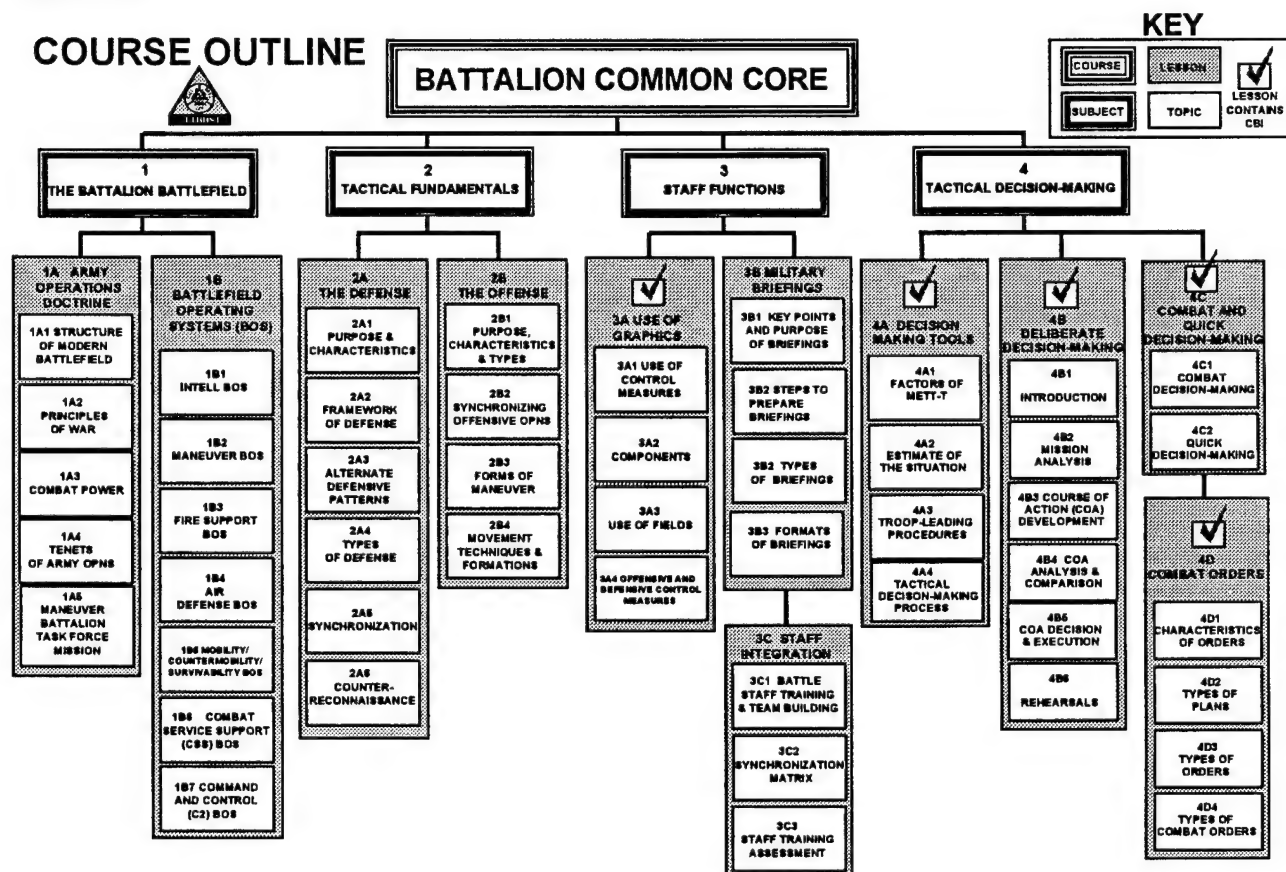


Figure 5. Sample/course map

The courses were organized by subjects. Within each subject, lessons to be taught were identified. Additionally, each lesson was prepared to correspond to a task or tasks previously identified in the TLO. The lessons were further subdivided into topics of instruction that directly addressed the performance measures.

Text-Based Lessons

Using the established performance measures for the lesson, the contractor military expert (CME) prepared a draft outline presenting the instructional material in a logical flow. The CME then wrote the lesson material, referring frequently to doctrinal references. Throughout the

writing process, peer review and assistance was a common practice, especially in technical areas where another CME had expertise. (The CME team members totaled more than 170 years of Army service; represented combat arms, combat support, and combat service support branches; had combat as well as CTC experience (observer/controllers, OPFOR, and unit rotations); and completed numerous duty assignments as battalion and brigade staff officers.)

QA review was constant in the writing process. The first review was performed by the individual writer, checking to ensure that the lesson contained instruction for each of the performance measures, presented in a logical, orderly process. Additional checks verified use of the most current doctrinal reference material, compliance with the established format, and that the text was grammatically correct.

An informal review was conducted by peers to identify any doctrinal inconsistencies or ambiguous areas in the text. If the meaning of the text was not readily understandable, the material was rewritten for clarity. The course development manager then conducted a review focused on grammar, adherence to established format, doctrinal issues, and consistency with other courses.

The course development manager and instructional systems design (ISD) representative served as material integrators. The ISD representative looked to see if the text met identified performance measures, then checked the work for information flow and attention to detail. After the text lesson went through the review process, appropriate fixes were incorporated.

Job Aids

In addition to text-based lessons, training support materials (job aids) were developed. These job aids were designed to supplement the course of instruction, and provided sample formats, organizational charts, or equipment capabilities data. All of this material was developed along with the instructional material and underwent the same QA process.

Storyboards (Computer-Based Lessons)

As was done with the text lessons, the computer-based lessons were developed (Figure 6) using established performance measures. In some cases entire lessons were selected for CBI and in other instances only selected topics were prepared. Since CBI is non-linear in progression, the CME prepared a draft outline that included, not only instructional content, but also a proposed branching structure between menus and instructional modules.

The draft outline presented the instructional material in a logical flow and served as the basis for a production meeting between the course development and CBI teams. This meeting allowed early coordination for the various graphic support items that would be required and suggestions for revising the course structure. The CME then developed instructional material by preparing storyboards, which consisted of the proposed graphic display (slide, photo, video, etc.) and the corresponding narration. Peer review and assistance during development was used in technical areas where one CME had specific expertise.

The same QA review as outlined earlier for text-based lessons was used for computer-based lessons. Review started with the individual writer, progressed through peers, the course development manager, and the ISD expert. Once programming of course material was in progress, there was continual interface between the CME and the CBI team.

Tutorials

Based on task analysis and existing material from the original BSTS courses, some lessons were selected to be 100 percent CBI. These lessons presented the instruction in an interactive lecture type mode, where the student progressed through the instruction using the computer as a trainer. All information was contained in screen displays and narration. There were numerous branching options and navigation possibilities so the student could progress at a personal pace, skip past topics that had already been mastered, and study only the desired sections. While the student was allowed to select the navigation options and the pace at which the material was reviewed, the instruction was tutorial in nature.

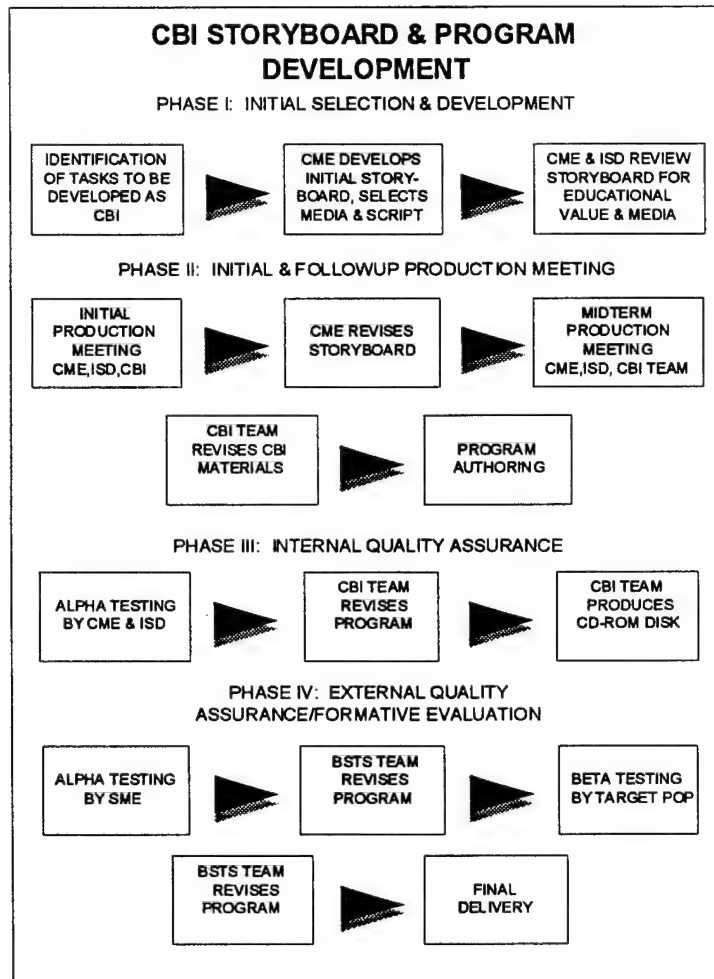


Figure 6. CBI development process

Practical Exercises

In many cases, merely reading and studying a specific topic did not necessarily assist the student in mastering the desired skill. To help the student learn, practical application was often appropriate. All practical exercises were 100 percent CBI and required extensive interaction from the student. In most cases, the exercises were driven by a scenario based on the SIMBART

operation orders. The exercises placed the student in a simulated staff officer's position. The student then used and applied the skills just studied.

Media Selection

As mentioned earlier, part of task analysis involved selecting the best means of presenting the course material, either text or CBI. For text-based lessons, visual aids were developed and included in topics where the material could be better understood through a combination of visual and text information. For those lessons and topics that were to be computer-based, a more complex media selection process was applied.

Computer-based lessons and practical exercises were designed to assist the student in learning selected topics, generally those more complex or technical in nature. To display the information in a simple form, various visual presentations were used. For less complex topics, word charts highlighting key ideas were the visual media. Where a graphic depiction or photo helped simplify a point, it was employed. In some cases, actual video footage was deemed appropriate so the student could more closely relate to the topic being presented. The intent was to display the presentation media that best assisted the student in comprehending the instructional material.

Technical specifications for the student computer station maintain compatibility across all the BSTS programs using the Military Personal Computer standard (MPC-2). Bulletin board and "chat" capabilities are available to BSTS staff officers in either the wide area network (WAN) mode or, the local area network (LAN) mode installed at Fort Knox. Students can also complete a course in a stand-alone computer mode developed under ITTBST-BSTS. These communication methods, available in the EMMii software, can prepare battle staff officers for collective tasks that are at the heart of training issues uncovered in ARI research.

Lesson and Subject Assessments

The established BSTS assessment model was applied throughout the two commander's courses. At the beginning of every subject, the student was given the option of taking a pre-test to assist in identifying areas needing the most training. Before starting the instructional material, the student then knew which areas of performance were weak so as to be able to review the necessary doctrinal references. The pre-test had to be completed in order to access the lesson exams.

After completing a lesson, the student was directed to take an exam that addressed the specific course material just studied. The questions were designed to evaluate the student's comprehension of the instructional material. The exams were constructed so as to be knowledge based, not scenario driven. In some instances, the student had to apply learned skills, but not in a simulated tactical situation. Following each subject, the student then progressed to the post-test. This test contained the same questions as the pre-test, but the questions were presented in a random sequence. The questions addressed performance measures from all lessons within the subject. For both the post-test and lesson exams, the student received feedback immediately after answering the question. The feedback told the student whether or not the answer was correct, restated the correct answer, and provided additional or reinforcing information in that topic area. This technique allowed the student to track progress throughout the test/exam, identify weak points, then concentrate follow-up study in the needed areas.

Internal review of all tests was completed just as on other instructional material. Individual CMEs conducted a self-review, followed by peers, course development manager, and ISD edits. Very close attention was given to ensure that all performance measures were adequately evaluated on the appropriate tests. The specific wording of questions was carefully

examined to eliminate possible confusion or minor inconsistencies in wording between instructional material and test questions. The intent of the exams was to evaluate and reinforce learned skills.

COMPS

The COMPS were included in BSTS to provide a comprehensive assessment of the student's ability to perform critical tasks, acquired in the related course of instruction, in a tactical scenario. COMPS were based on critical tasks identified in the FEA. Unlike the knowledge-based questions used in the pre-tests, post-tests, and lesson examinations, COMPS questions were application-based. Questions were based on the NTC scenarios provided in the SIMBART operation orders: MTC, DATK, and DIS. All questions were in a computer-based instruction format, standalone, and not interlinked.

The COMPS questions were designed to assess all performance measures for the related course. COMPS were designed and developed through a review process of critical tasks and performance measures by the CME and BSTS design team. All questions were one of the following three forms:

1. True/False. These questions were constructed so as to have the correct response, noted in parentheses after the question, and include feedback.
2. Multiple Choice. Multiple choice questions had the distracters listed after the question. Each response was designated "Correct" or "Incorrect" and included feedback. Feedback for incorrect answers included stating the correct answer. Questions were designed to have a maximum of five possible choices
3. Matching. Matching questions had a maximum of 7 responses per matching group. Feedback statements were provided for each response.

COMPS were developed as a stand-alone component of the courseware. The design of COMPS provided limited security through the use of hidden files; authoring of test questions using *Icon Author's* SmartObject text; random ordering of questions; and the random ordering of answers/distracters within multiple choice questions. All questions were permanently marked by a unique, randomly generated identification number consisting of seven (7) alpha-numeric characters in the upper corner of each test question screen, the Question Unique Identification Number, Test (QUINT). The QUINT number was intended to permit rapid and accurate identification by systems management personnel.

COMPS underwent all phases of FE with the text and CBI courseware. QA criteria for COMPS included: spelling and grammar; all buttons and navigational tools working properly; questions properly coded for the correct and incorrect responses; results properly coded to link to EMMii; an assigned QUINT; no QUINT duplication; scores properly determined; questions linked to the portion of the lessons within the subject and course from which they were developed; random ordering of questions; and random ordering of answers and distracters.

Remediation Component

A remediation component was developed for each BSTS lesson where necessary. The cutoff score set for lesson examinations was 80 percent, 10 percentage points higher than the current TRADOC standard for student performance in a proponent-offered course of instruction. This performance level was judged to be consistent with the "job entry level" for each position addressed in BSTS courses. When a Beta test participant could not attain an 80 percent cutoff score in an examination, the lesson was carefully reviewed to judge the necessity for remediation.

First, the complexity and difficulty of the lesson material was examined for any indication that remedial instruction might be needed.

Second, the original BN-BSTS and BDE-BSTS FE data were analyzed to determine those critical tasks that target population officers were having difficulty mastering. The analysis considered the following factors:

1. Adequacy of Beta participant qualification. (Participants were occasionally found to be unqualified in the areas they were evaluating.)
2. Time spent in study of materials. (In a number of instances, participants spent either a few minutes or no time at all on course materials prior to taking the lesson exam.)
3. Percentage of improvement from pre-test to post test. (There were several instances of Beta participants scoring lower on the post test than on the pre-test.)
4. Terminal performance as measured by the lesson examination.

Based on Beta test results of previously developed BN/BDE-BSTS courses, certain lessons met the criteria for remediation, but, due to other considerations were completely redesigned. Beta testing of the revised lessons in ITTBST-BSTS suggested remediation was not necessary.

Third, as the courses themselves were Phase III Beta tested, feedback from students and raw scores on the tests pointed to areas in need of remediation.

The lessons with remediation components, based on ITTBST-BSTS and previously conducted BN/BDE-BSTS test results, are listed in Table 2.

Table 2

Courses and Component Lessons With Remediation

Course	Lesson(s)
Brigade Air Defense Officer	2A. Integrated Combat Airspace Command and Control (ICAC ²) 2B. Airspace Control Measures
Brigade Chemical Officer	1A. Organization and Duties
Battalion Commander	3G. Aviation Support 4B. Forward Support Battalion 4C. Task Force Support
Battalion S3 Air	3A. ICAC ² 3B. Airspace Control Measures
Battalion Chemical Officer	1A. Organization and Duties 2A. Avoidance and Protection Operations

Remediation module development followed the same procedures as those previously outlined for course development, with the exception that they were developed as 100 percent CBI lessons. Remediation storyboard development followed the same procedures as outlined for all courses.

Following QA and Alpha testing by BSTS personnel, the completed remediation module was incorporated into EMMii and delivered for Phases II-IV of FE.

The entry method into remediation is shown in Figure 1 as part of the course/ lesson flow. When a student scores less than 80 percent on a lesson that has a remediation module, the lesson remediation button automatically appears on the CBI lesson menu. This affords the student the opportunity to take the remediation module. When the student achieves an acceptable score, EMMii is updated with that score.

FORMATIVE EVALUATION

Design

The evaluation method chosen for ITTBST-BSTS purposes was FE. As outlined in the Development Methodology section, a progressive three-phase evaluation model was implemented: (a) internal review by contract team members, (b) external evaluation by military SMEs, and (c) external testing by target population representatives.

Specifically, FE was designed to determine if:

1. Training can be implemented as designed.
2. Students who complete a course can be assessed in a comprehensive manner.
3. Training is developed at the correct educational level.
4. Instructional materials are of high quality, correctly reflect course design decisions, identify training objectives and performance standards.
5. Instruction is doctrinally correct.
6. The instruction appropriately illustrates and describes the material.
7. Students performed to prescribed standards after training, and improvement in performance can be measured.
8. The student critique system affords the student the opportunity to freely make comments about instruction and administrative support matters.
9. The instructional environment is conducive to learning.
10. Student learning is taking place through opportunities for interaction, student practice, testing, and reviews.

FE was also used to determine the reliability of the computer hardware and software delivering the training, as well as its ease of use and functionality.

Procedures

The FE exercises were conducted on government provided hardware compatible with hardware and software of previous BSTS courseware. For external FE, the courses were integrated into the training management system and placed on the LAN in the BSTS developmental laboratory in Skidgel Hall, Fort Knox. Officer participants were coordinated by the COR and selected by the government. Analysis of FE results served as the basis for the revision of TSPs to ensure accomplishment of course terminal learning objectives.

The FE of the 28 BSTS courses included evaluation of CBI, text, COMPS, remediation, and the hardware and software providing the operating environment for the computer-based courseware. The BSTS team executed FE in three phases:

1. Phase I - Alpha testing by CMEs.
2. Phase II - Alpha testing of the complete (draft) TSP by military SMEs, one SME per course.
3. Phase III - BETA testing of the complete (draft) TSP by target population officers; 2-5 participants per course.

To this three-phase plan was added a Phase IV: Review of the final TSP under the direction of the COR at the laboratory in Skidgel Hall.

The 28 TSPs were divided into seven groups of courses for efficient management of the process. Prior to the start of each external iteration, participants were briefed on the BSTS program as well as the conduct of the evaluation.

During the conduct of external FE, BSTS team members observed the evaluation to record observations, and were available to assist participants with hardware and software issues. To measure the effectiveness of courseware, FE data collection forms were prepared by the BSTS team and approved by the government (Appendix B).

Troop support requirements for FE activities were substantial. In excess of 149 participants were required from Fort Knox and the proponent TRADOC schools for Phases II-IV. Constant coordination was required between the COR and BSTS team to ensure a smooth execution of the evaluations. There was a designated FE Coordinator on the BSTS team to plan and coordinate the troop support requirements with the COR and the ARI Armored Forces Research Unit Research and Development Coordinator. These personnel integrated BSTS requirements with the requirements for the other ITTBST projects.

Phase I - Alpha Testing by CMEs

The BSTS Team conducted internal FE as delineated in the training development models in Figures 4 and 6. At each of the analysis, design and development steps, at least one CME, the team manager/leader, and the ISD representative conducted Alpha testing. Phase I evaluation included the following:

1. Verification that the comments and lessons learned provided by Armor School SMEs (from previous BSTS efforts) were included in the revised TSP.
2. Adherence to the FEA in the training of critical tasks.
3. Within the context of the FEA, confirmation that applicable BFs were included.

4. Confirmation that tests (diagnostic pre-tests, lesson exams and quizzes, post tests, and the COMPS) accurately measured how well the student had performed.
5. Adherence to standards for grammar, punctuation, and format.
6. Correct application of doctrine to include the most current doctrinal reference; tactics, techniques; and procedures (TTP); lessons learned; and SME input from the CTCs.
7. Application of practical exercises for critical tasks and concepts based on the SIMBART operation orders.

Phase II - Alpha Testing by Military SMEs

Revised TSPs were presented at Fort Knox for Phase II testing by the government furnished SMEs. In excess of 30 SMEs were required for this phase of evaluation. This phase sought the written input of at least one SME for each course of instruction. The task of the SMEs was to determine the doctrinal accuracy of the TSP, whether the PEs supported the training of the lesson content, and if the tests (pre-tests, lesson exams and quizzes, post tests and COMPS) reasonably evaluated the subject matter that was trained. Additionally, SMEs provided written comments on the computer hardware, software and the training management system under which the computer-based instruction operated. Close coordination between government and contractor personnel ensured timely evaluation and delivery of TSPs.

Phase II testing results were collected by the BSTS team members on site at Fort Knox during the entire 13 month testing period, then returned to the BSTS development team for inclusion into the revised TSPs. A copy of the Phase II test results with recommended actions for enhancement of the TSPs was provided to the COR for review and comment.

Phase III - Beta Testing by Target Population Officers

Third generation TSPs were delivered to Fort Knox for Phase III testing by the government furnished target population officers. In excess of 77 officers from the target population were required for this phase of evaluation. Phase III testing of each of the 28 courses was conducted by 2-5 target population officers. Target population personnel were selected from the following: graduates of the Officer Basic Course (OBC), Officer Advanced Course (OAC), battalion and brigade command designated officers, and TRADOC proponent school SMEs. A description of the target population for each of the BSTS TSPs is provided at Appendix C.

Complete TSPs were evaluated, to include: the text, CBI, examinations, COMPS, and the corresponding remediation component. Data were collected to ensure that participants could meet the established standards. The FE procedures included direct observation, questionnaires, individual interviews, and on-line evaluation and feedback from the participants.

Phase IV - Final Review by the COR

The refined TSPs were delivered to Fort Knox for Phase IV review by the COR and government furnished personnel. In excess of 28 personnel were required for this phase of evaluation. Phase IV FE was conducted to ensure that all planned revisions to the TSPs, contained in the recommended actions section of the Phase III report, were in fact included.

Key items of review during Phase IV included completeness of revisions, functionality of all navigational buttons in CBI, and that all CBI graphics colors were correctly displayed on the target hardware.

Revision of Training Products

The results of Phase II, III, and IV FE testing were summarized in a report for the review and approval of the COR. An example of a Phase III (Beta) report is at Appendix D. Of key importance in this report is Enclosure 3, Recommended Actions. Based on the recommended actions (included in all Phase II-IV reports) and feedback from the COR, the TSP was revised and the resulting TSP delivered to the COR for subsequent review, culminating in the final COR review (Phase IV). This process enabled the COR to view the raw evaluation data from the students as well as the recommended actions to be taken.

Results

The output of the four-phase FE process was the 28 final TSPs specifically developed and evaluated to enhance the warfighting skills of the brigade and battalion commanders and their respective battle staffs. These final TSPs consisted of 294 hours of CBI plus 341 hours of text, for a total of 635 hours of instruction. Text was presented in a loose-leaf notebook and the CBI copied onto one or more CD-ROMs.

A summary of selected data from the FE process is contained in Appendix E.

DISCUSSION

Application of the Products

The ITTBST-BSTS TSPs were developed to train the armored force brigade and battalion commanders and their key battle staff members in their individual warfighting tasks. The start point for the project was the existing 26 TSPs developed under the BN- and BDE- BSTS programs. To this baseline was added courses for the brigade and battalion commanders. All 28 TSPs were enhanced with newly published tactical doctrine, TTPs, CALL lessons learned, and input from CTC O/Cs. Additionally, the project integrated the SIMBART operation orders into PEs and the end of course COMPS. This enhancement facilitates the use of the TSPs in an integrated training strategy from individual training (BSTS), through staff group training (SGT), to collective training (SIMUTA, SIMBART, and COBRAS exercises).

The TSPs are designed to be employed in a TRADOC school, a tactical unit, an installation learning center, national guard armory, reserve training center, or at a student officer's home. In addition to the TSP, a 486 processor-based multimedia computer is required to conduct the training. (A listing of hardware and software requirements is provided at Appendix G and is included on each of the CD covers.) All required training materials are contained in the course textbook (student guide) and the accompanying CD-ROMs that contain all required courseware and application software, with one major exception. Course materials contain an operation order overlay, but not a map. The required maps may not be readily available to all students and course proponents would do well to consider their inclusion in the TSP.

The target population officer (Appendix C) is, depending on assigned staff position, a branch qualified graduate of the respective branch OBC, OAC, Combined Arms and Service Staff School (CAS³), or Command and General Staff College (CGSC) that has been assigned, or is pending assignment, to an armored force battalion or brigade. An officer should take the appropriate course as early as possible on notification of assignment. In addition, the courses are available as needed for refresher or cross training, as desired. Courses are designed so that a

student's first use of ITTBBS-BSTS should include the Common Core course. After that, the student is prepared to take any specialty course desired.

Review of FE feedback has led to several considerations. Students must approach the course material with a desire to learn and improve their skills. Trainers and commanders should *not* use exam scores to "evaluate/rate" their staff personnel. BSTS needs to be used as a teaching and training vehicle, *not* a means to score performance, which follows the same philosophy as rotation results from any actual CTC.

Implementation Considerations

The TSPs have been designed for the total force, active and reserve, assuming the organization has a multimedia computer with the specifications provided at Appendix G. Implementing FM 25-100 (Department of the Army, 1988) as well as FM 25-101 (Department of the Army, 1990), the TSPs are meant to be executed under the tutelage of a trainer, using the Trainer's Guide to assist in implementation. However, students with access to the proper computer equipment may take the course on their own.

The TSPs can be implemented in a LAN, WAN or stand-alone computer configuration with a CD-ROM capability. Figure 7 shows a model of the network implementation. The data generated by a student completing a TSP are recorded in the EMMii data base in the LAN mode and can be uploaded to the data base from WAN and stand-alone mode.

Within the Unit/TRADOC School/Learning Center

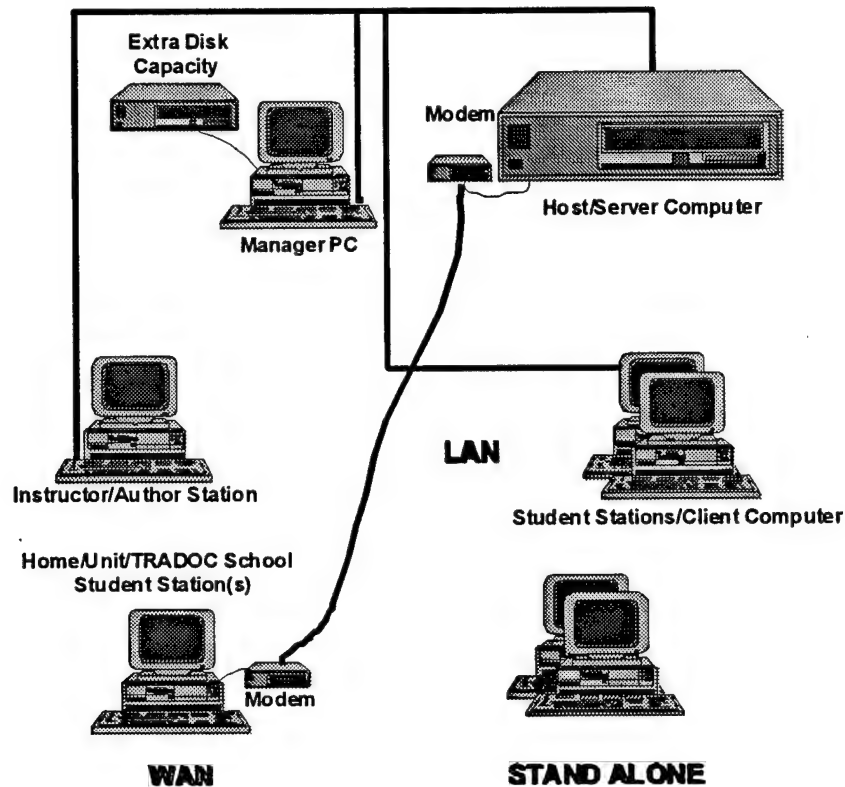


Figure 7. Network implementation model.

A training management system (TMS) administrator has access, through the Training Information System (TIS) database, to student records that include not only the student's performance on the TSP but data collected to assist training developers in maintaining doctrinal accuracy. Detailed information is maintained on student comments, performance on examinations (including statistical analysis of each question in each examination), and the courseware.

Test Participant Reactions

The FE results indicate that staff officers are receptive to new training techniques. Based on participant ratings, CBI and text lessons were much preferred over reading standard Army doctrinal references. There are some fundamental issues that should be considered, however, as the Army transitions to CBI or various forms of distance learning. Provided below are various observations gleaned from the FE during this project.

As is true with any self-paced instruction, the student must be motivated to learn and proper supervision must be applied. Analysis of Beta test data indicated exam scores below expected standards of performance, but demographic analysis of participants provided possible reasons. Only a minority of Beta participants were actually officers that fit the profile of those for whom the course was intended. In a random sample of 30 participants, for example, only 8 were in the target population. There is a reasonable expectation that a target population officer actually being transferred into a brigade or battalion staff would have a greater motivation to use the course in the manner originally intended. Once BSTS is implemented, an officer motivated to obtain the courseware should dedicate the time required to study the material. Officers directed into the course by superiors or school instructors must be provided the needed time and supervisory assistance.

Based on accumulated survey data, participants spent an average of only 2 hours reading doctrinal references for each of the battalion courses and an average of 4 hours for each of the brigade courses. This is significantly below the estimated average of 65 hours needed to review all doctrinal references for a course. In addition, the average participant spent about 8 hours less per course reading the text-based lessons than was projected. This could support the hypothesis that participants read through the text lessons quickly for short-term retention (indicated by lesson exam scores) and scored lower on the COMPS which required longer term retention of information. Trainers using BSTS courses should ensure sufficient time is allocated so officers can properly review the material required.

COMPS questions that required a student to do other than repeat data (for example, analyze orders, evaluate scheme of maneuver, compare with commander's intent) were frequently assessed as judgmental in participant feedback. While practically all scenario-based questions are situation dependent, the fundamental information provided in the scenario is sufficient to lead a student to a logical conclusion/answer. Based on assessment of student comments, students seemed to expect perfect information and clear-cut situations that did not require analysis, interpretation, and assessment. In real situations, information is frequently incomplete and often confusing. The intention of the COMPS questions was to require the participant to conduct analysis in order to arrive at a solution.

Participants rated the CBI and tailored text nearly two to one over doctrinal references for their educational/training value. Participants also generally preferred scenario-based and practical application exam questions. This indicates that interactive, scenario driven CBI may be a valuable method for maintaining an active interest in the material by students.

LESSONS LEARNED

During TSP preparation, a number of issues were identified which represented a significant impact (cost, schedule, or both) on the program plan. Lessons learned from the design, development, and evaluation of ITTBBBST-BSTS courses are provided in this section.

Program Design

Throughout the development of these courses, numerous doctrinal manuals were revised and published, mandating modification of course content. There should be a provision in the program initiating document that allows each item of new material to be expeditiously assessed jointly by the government and the contractor. Cut-off dates for reference material should be established and enforced. There is a point at which the expense and effort of including newly developed data in a course approach diminishing returns, and that point should be set early in the process.

It is essential that the government be an active participant and reviewer of the FEA. The FEA will drive the entire course design, development, and content. The government can use contractor expertise to develop the draft FEA and course outline, but government review and expeditious approval is imperative. Modifications of course design and content after the course is under development can lead to duplication of effort and wasted time.

The government should provide the most current doctrinal and reference material for course development. This would ensure that the government has control over the material being used as the foundation for the course, and could make assessments of what material to include once the project has started. It also simplifies the process of obtaining doctrinal references.

Development Methodology

As key sections of lessons were complete, and in some cases as they were being written, course developers would consult with other developers for their review and comment. This facilitated consistency of doctrinal information between courses and improved course structure. Concurrent peer review by other CMEs slowed the initial development process to some degree, but the advantages outweighed the time spent. Conducting peer review throughout the development phase and omitting it at the end of lesson development still allowed lesson material to be produced on time, but with an increased information interchange and improved quality. A final overall review was conducted by the course development manager.

Individual CMEs were assigned as the resident experts in particular subject areas. They studied new material, provided a summary to other CMEs, and became the focal point for issues in that arena. This saved some time and precluded the requirement for every CME to review all new material, while ensuring a degree of consistency between courses. This technique facilitated cross-leveling of information in a fast-paced development process.

If it became available in the course development process, photo or video media were incorporated in courses still being developed. In addition, this material was retrofitted into previously developed courses wherever possible and appropriate. While this effort required additional contractor resources, it helped ensure the best available material was included in the courses. Copyrighted music segments are included in some of the subject introductions. Written approval from the company holding the rights to this music is pending.

Developing prototype training materials using innovative techniques and technology is a complicated, time consuming process, exacerbated by evolving doctrine and resultant identification of new requirements. Contractor staffing and scheduling need to support thorough internal operational testing before delivering TSPs for external testing, with the flexibility to accommodate changes.

The equipment, software, and authoring tools used for this project were adequate. As more video and graphic material were incorporated into the CBI, maximum capacity of the computers was reached on many occasions. To make maximum use of available time and ensure the highest quality multimedia material, the equipment used by CMEs and programming authors should be upgraded for future efforts.

In a heavy usage situation, Army customers (units or schools) should be prepared to replace CD-ROM drives on a regular basis. Those drives that do not use a caddy are generally more reliable than those that do.

Formative Evaluation

During FE, statistical data were compiled on course material in order to make effective judgments on content and presentation. In addition, demographic data were gathered on Alpha and Beta participants in order to assess the validity of their replies and the effectiveness of the FE process itself. Both types of information were essential in order to properly assess comments and determine what modifications to instructional material were needed.

Several Beta testers, were not in the target population for the course they evaluated. Beta testing should be accomplished by actual target population personnel. Testing by other than target population officers leads to inconclusive, and occasionally inaccurate results concerning whether or not the material accomplishes its intent. In addition, non-target population personnel completing the course were less likely to possess the requisite experience and skills. This could lead to an inaccurate conclusion that remediation training was necessary, simply because a non-branch qualified or inexperienced officer didn't have the requisite background.

Review of participant feedback during FEs was not performed adequately at the testing site. Participant comments were often illegible and difficult to read, and frequently very unclear in intent. Some forms were not properly completed, which meant required data had to be extrapolated from available information. This required the CMEs to "interpret" comments and intent in order to make suggested modifications to course material. Both the government agency supervising the test participants and the contractor must ensure that all participants are fully briefed on their responsibilities and debriefed at the conclusion of their participation. Throughout testing, periodic checks must be conducted on all participants to ensure compliance. On-site team members experimented with entering comments into a computer database, and this might be pursued in future efforts. In addition, providing a course developer at the testing site could resolve some participant issues during testing.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

For each subject in every course, the participant was required to take a pretest before beginning the instructional material and a post test at the conclusion. The post test contained the same questions as the pretest, but they were presented in a scrambled sequence. Based on the scores for all courses across all Beta participants, the average improvement in test scores, from pretest to post test, was more than 20 percent.

Each individual lesson was evaluated independently to ascertain that student average exam scores met or exceeded the established 80 percent standard. For lessons where the standard was not achieved, remediation modules were developed. The overall average lesson exam score for all battalion level courses, based on more than 250 scores, was 87 percent. The overall average lesson exam score for all brigade level courses, based on more than 260 scores, was 89 percent.

Some lessons have a remediation component for students that have difficulty learning the material from the basic lesson. Participant scores increased about 15% from the original taking of the lesson exam to the exam score following completion of the remediation component. This apparent positive effect of remediation may be skewed due to the fact that less than a third of participants were from the target population, and those participants from the target population showed no need for remediation.

The COMPS were the only course component that forced participants to fully use synchronization skills, one of the basic goals of the ITTBST-BSTS program. This aspect made them extremely valuable from an instructional standpoint.

Continuous FE is essential throughout the development program. Active participation by users, as well as the CME peer review process, markedly improved the product.

Recommendations

The development schedule needs to provide sufficient time to incorporate revisions to course material following Alpha testing. When developing new courses, more alterations should be anticipated, and hence more time to incorporate changes after Alpha testing.

Feedback from participants and test results indicate that BSTS courses are valuable TSPs. Course materials should be reproduced and distributed throughout the Army, for use in schools and units.

To increase the probability of student learning and decrease the possibility of test question compromise, pretests, post tests, and lesson exams could be rewritten. True/false questions could be replaced with multiple choice questions. Additional questions could be developed so pretests and post tests contain different questions. Each exam could consist of a pool of questions so each time the exam is taken, it would present a random selection of questions from those available.

Course developer representatives should be present on site during Alpha/Beta FE to capture data through interviews in addition to participant-prepared surveys. This shift in data collection methods, while more time-consuming, would produce more uniform quality of feedback, a better understanding of participant concerns about the courses, and reduced time requirements for developers to analyze participant responses and prepare course fixes.

While the latest draft of TRADOC Pamphlet 350-70-2, *Multi-media Courseware Development Guide* (U.S. Army Training and Doctrine Command, 1996), provides some detailed guidance for producing multimedia courseware, it should be reviewed and updated by organizations that have current CBI development experience.

All training materials must be evaluated periodically to ensure they satisfy training requirements and contain current, accurate information based on the latest doctrine and available equipment. BSTS courses must be subjected to evaluation and updated as necessary. The government must establish the procedures and capability to maintain this courseware, either with internal assets or through external contract.

Because of the rapidly growing array of multimedia capabilities, programs should be developed for MPC3 compliant computers or better. MPC2 is not adequate to make full use of the BSTS software. Courses for other staff officers in other types of units and organizational staff levels should be developed. Based on lessons learned and student suggestions, there are various innovations that could enhance the courses. Further research into emerging state-of-the-art technologies and techniques is in order.

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ACRONYMS AND ABBREVIATIONS

ADO	Air Defense Officer
ARI	U.S. Army Research Institute for the Behavioral and Social Sciences
ASAT	Automated Systems Approach to Training
ATSC	Army Training Support Center
AUTL	Army Unit Training List
BBS	Brigade/Battalion Battle Simulation
BCBL	Battle Command Battle Lab
BDE	Brigade
BDE-BSTS	Brigade Battle Staff Training System
BF	Battlefield Function
BN	Battalion
BN-BSTS	Battalion/Task Force Battle Staff Training System
BOS	Battlefield Operating System
BSHB	Battle Staff Handbook
BSTS	Battle Staff Training System
CAS ³	Combined Arms and Services Staff School
C ²	Command and Control
CALL	Center for Army Lessons Learned
CBI	Computer-Based Instruction
CCF	Critical Combat Function
CD-ROM	Compact Disc-Read Only Memory
CGSC	Command and General Staff College
CHEMO	Chemical Officer
CME	Contractor Military Expert
COBRAS	Combined-Arms Operations at Brigade Level, Realistically Achieved through Simulation
COMPS	Comprehensive Assessment Component
COR	Contracting Officer's Representative
COTS	Commercial Off-the-Shelf
CSS-BSTS	Combat Service Support/Battle Staff Training System
C/ST	Commander/Staff Trainer
CTC	Combat Training Center
DATK	Deliberate Attack
DIS	Defend in Sector
DO	Delivery Order
EMMii	Environment for Multi-Media Interactive Instruction
ENG	Engineer
FE	Formative Evaluation
FEA	Front-End Analysis
FM	Field Manual
FSO	Fire Support Officer
FXITP	Force XXI Training Program
HumRRO	Human Resources Research Organization
ISD	Instructional Systems Design
ITTBST	Innovative Tools and Techniques for Brigade and Below Staff Training
LAN	Local Area Network
MOP	Measure of Performance
MPC	Military Personal Computer
MTC	Movement to Contact
NTC	National Training Center
OAC	Officer Advanced Course
OBC	Officer Basic Course

O/C	Observer/Controller
OPORD	Operation Order
PE	Practical Exercise
QA	Quality Assurance
QUINT	Question Unique Identification Number, Test
S1	Administrative Officer (battalion or brigade staff)
S2	Intelligence Officer (battalion or brigade staff)
S3	Operations and Training Officer (battalion or brigade staff)
S4	Logistics Officer (battalion or brigade staff)
S5	Civil Affairs Officer (battalion or brigade staff)
SAT	Systems Approach to Training
SGT	Staff Group Trainer
SIGO	Signal Officer
SIMBART	Simulation-Based Mounted Brigade Training
SIMITAR	Simulation In Training for Advanced Readiness
SIMNET	Simulation Networking
SIMUTA	Simulation-Based Multiechelon Training for Armor Units
SME	Subject Matter Expert
SOW	Statement of Work
SGT	Staff Group Trainer
TADSS	Training Aids, Devices, Simulators and Simulations
TCS	Task, Condition, and Standards
TD	Training Development
TF	Task Force
TIS	Training Information System
TLO	Terminal Learning Objective
TMS	Training Management System
TRADOC	U.S. Army Training and Doctrine Command
TSP	Training Support Package
TTP	Tactics, Techniques, and Procedures
WAN	Wide Area Network
XO	Executive Officer

APPENDIX A

BSTS Doctrinal Sources List

Field Manuals

FM 1-100 *Doctrinal Principles for Army Aviation in Combat Operations*
FM 1-111 *Aviation Brigades*
FM 1-112 *Tactics, Techniques, and Procedures for the Attack Helicopter Battalion*
FM 3-3 *Chemical and Biological Contamination Avoidance*
FM 3-3-1 *Nuclear Contamination Avoidance*
FM 3-4 *NBC Protection*
FM 3-5 *NBC Decontamination*
FM 3-7 *NBC Handbook*
FM 3-19 *NBC Reconnaissance*
FM 3-50 *Smoke Operations*
FM 3-100 *NBC Defense, Chemical Warfare, Smoke, and Flame Operations*
FM 3-101 *Chemical Staffs and Units*
FM 5-7-30 *Brigade Engineer and Engineer Company Combat Operations (Airborne, Air Assault, Light)*
FM 5-33 *Terrain Analysis*
FM 5-34 *Engineer Field Data*
FM 5-71-3 *Brigade Engineer Combat Operations (Armored)*
FM 5-71-100 *Division Engineer Combat Operations*
FM 5-100 *Engineer Operations*
FM 5-100-15 *Corps Engineer Operations*
FM 6-20-10 *Tactics, Techniques, and Procedures for the Targeting Process*
FM 6-20-20 *Tactics, Techniques, and Procedures for Fire Support at Battalion Task Force and Below*
FM 6-20-30 *Tactics, Techniques, and Procedures for Fire Support for Division and Corps*
FM 6-20-40 *Fire Support for Brigade Operations (Heavy)*
FM 6-20-50 *Tactics, Techniques, and Procedures for Fire Support for Brigade Operations (Light)*
FM 6-60 *Tactics, Techniques, Procedures for the Multiple Launch Rocket System (MLRS) Operations*
FM 6-71 *Tactics, Techniques and Procedures for Fire Support for the Combined Arms Commander*
FM 6-121 *Tactics, Techniques, and Procedures for Field Artillery Target Acquisition*
FM 7-90 *Tactical Employment of Mortars*
FM 8-10 *Health Service Support in a Theater of Operations*
FM 9-43-2 *Recovery and Battlefield Damage Assessment and Repair*
FM 10-23 *Basic Doctrine for Army Field Feeding*
FM 10-52 *Water Supply in the Theater of Operations*
FM 11-32 *Combat Net Radio*

FM 11-37 *MSE Primer for Small-Unit Leaders*
 FM 11-43 *The Signal Leaders Guide*
 FM 11-50 *Combat Communications within the Division (Heavy and Light)*
 FM 12-6 *Personnel Doctrine*
 FM 16-1 *Religious Support*
 FM 19-40 *Enemy Prisoners of War, Civilian Internees, and Detained Persons*
 FM 20-32 *Mine/Countermining Operations*
 FM 25-101 *Battle Focused Training*
 FM 33-1 *Psychological Operations*
 FM 34-1 *Intelligence and Electronic Warfare Operations*
 FM 34-2 *Collection Management*
 FM 34-2-1 *Reconnaissance and Surveillance and Intelligence Support to Counterreconnaissance*
 FM 34-3 *Intelligence Analysis*
 FM 34-8 *Combat Commander's Handbook on Intelligence*
 FM 34-10 *Division Intelligence and Electronic Warfare Operations*
 FM 34-10-2 *Intelligence and Electronic Warfare Equipment Handbook*
 FM 34-25 *Corps Intelligence and Electronic Warfare*
 FM 34-25-1 *Joint Surveillance Target Attack Radar System (Joint STARS)*
 FM 34-25-3 *All-Source Analysis System and the Analysis and Control Element*
 FM 34-37 *Echelons Above Corps (EAC) Intelligence and Electronic Warfare (IEW) Operations*
 FM 34-52 *Intelligence Interrogation*
 FM 34-60 *Counterintelligence*
 FM 34-80 *Brigade and Battalion Intelligence and Electronic Warfare*
 FM 34-81 *Weather Support for Army Tactical Operations*
 FM 34-81-1 *Battlefield Weather Effects*
 FM 34-130 *Intelligence Preparation of the Battlefield*
 FM 41-10 *Civil Affairs*
 FM 43-5 *Unit Maintenance Operations*
 FM 44-43 *Bradley Stinger Fighting Vehicle Platoon and Squad Operations*
 FM 44-64 *FAAD Battalion and Battery Operation*
 FM 44-100 *US Army Air Defense Operations*
 FM 55-12 *Movement of Units in Air Force Aircraft*
 FM 55-15 *Transportation Reference Data*
 FM 63-2 *Division Support Command, Armored, Infantry, and Mechanized Infantry Divisions*
 FM 63-20 *The Forward Support Battalion*
 FM 63-21 *Main Support Battalion*
 FM 71-2 *The Tank and Mechanized Infantry Battalion Task Force*
 FM 71-3 *The Armored and Mechanized Infantry Brigade*
 FM 71-100 *Division Operations*
 FM 71-123 *Tactics and Techniques for Combined Arms Heavy Forces: Armored Brigade, Battalion Task Force, and Company Team*
 FM 90-4 *Air Assault Operations*

FM 90-13-1 *Combined Arms Breaching Operations*
 FM 90-15 *J-SEAD, Multi-Service Procedures for the Joint Suppression of Enemy Air Defenses*
 FM 90-21 *JAAT, Multi-Service Procedures for the Joint Air Attack Team Operations*
 FM 90-25 *ALCO, Airlift for Combat Operations*
 FM 100-2-3 *The Soviet Army - Troops, Organization, and Equipment*
 FM 100-5 *Operations*
 FM 100-9 *Reconstitution*
 FM 100-10 *Combat Service Support*
 FM 100-16 *Army Operational Support*
 FM 100-26 *Air Ground Operations System*
 FM 100-42 *US Air Force/US Army Airspace Management in an Area of Operations*
 FM 100-103 *Army Airspace Command and Control in a Combat Zone*
 FM 100-103-1 *ICAC2, Multi-Service Procedures for Integrated Combat Airspace Command and Control*
 FM 100-103-2 *TAGS, Multi-Service Procedures for the Theater Air Ground System*
 FM 101-5 *Staff Organization and Operations*
 FM 101-5-1 *Operational Terms and Symbols*
 FM 101-10-1/2 *Staff Officers Field Manual Organizational, Technical, and Logistical Data Planning Factors (Volume 2)*

Other Publications

AR 165-1 *Chaplain Activities in the U.S. Army*
 AR 190-8 *Enemy Prisoners of War, Administration, Employment and Compensation*
 AR 600-8 *Military Personnel Management*
 AR 600-8-6 *Personnel Accounting and Strength Reporting*
 Command and General Staff College Student Text (ST) 101-5 *Command and Staff Decision Processes*, Feb 95
 US Army Air Defense Artillery School Student Text 44-43-1 *BFVS Platoon and Squad Operation*
 DA Pamphlet 27-25 *Prisoner of War: Rights and Obligations Under the Geneva Convention*
 TC 12-16 *PAC Noncommissioned Officer's Guide*
 TC 12-17 *Adjutant's Call the S-1's Handbook*
 TC 16-2 *Religious Support to Casualties, Memorial and Funeral Services*
 TM 11-5280-890-10-1 *Technical Manual Operator's Guide for the RT-1523*
 TM 11-7010-213-12 *Operator's and Organizational Maintenance Manual; Tactical Army Combat Service Support Computer System AN/TYQ-33(V)*
 ARTEP 71-2-MTP *Mission Training Plan for the Tank and Mechanized Infantry Battalion Task Force*
 ARTEP 71-3 *Mission Training Plan for the Heavy Brigade Command Group and Staff*
 FC 71-6 *Battalion and Brigade Command and Control*
 TRADOC Pamphlet 350-16 *Heavy Opposing Force (OPFOR) Tactical Handbook*

US Army Air Defense Artillery School Graphic Training Aid (GTA) 44-2-10 *Aircraft Recognition Playing Cards*

US Army Chaplain Center and School Reference Book, RB 1-1 *Unit Ministry Team (UMT) Handbook*

Battle Command Battle Laboratory *Leadership and Decision Making for War and Operations Other Than War (Draft 2.1)* Apr 94.

Battle Command Battle Laboratory *Battle Command Techniques and Procedures (1st Coord Draft)* Apr 95

Army Research Institute, Fort Benning Field Unit *Commander's Battle Staff Handbook with Garrison Duties*, 15 May 1993

Army Research Institute Fort Benning Field Unit *Brigade Commander's Battle Staff Handbook*, 11 March 1995

Center for Army Lessons Learned (CALL) Newsletter 91-1 *Rehearsals*, April 1991

APPENDIX B

Formative Evaluation Forms

ITTBBST-BSTS materials were evaluated through the use of military subject matter experts conducting alpha and beta testing of text and computer-based instruction. In addition to student evaluative comments of the material, demographic and doctrinal data was collected through the use of multi-page forms.

The primary focus of Alpha test participants was the doctrinal accuracy of materials. Alpha testers provided written comments on the doctrinal accuracy of text and CBI materials, as well as the value of practical exercises and exams in training the material and evaluating knowledge.

Beta testers were instructed to take the course as though they were regular students. Participants completed questionnaires, participated in individual interviews, and provided on-line evaluation and feedback.

Student packets of Formative Evaluation (FE) forms could be divided into three main categories: demographic data, comments on the instruction/evaluations, and comments on the value of the various course components. Examples of a form in each category are included in this appendix.

While student comments were vital to the course development/evaluation process, demographic data enabled comments to be placed in proper perspective. The lessons learned from BSTS (main body of this report) were developed through a study of student comments, cross-referenced with demographic data to give a reasonable understanding of the framework in which the remarks should be placed.

Students provided data on age, educational level, computer experience, service component (AC, ARNG, USAR, IRR), military qualifications, and assignments relevant to the course being evaluated. Demographic data provided as complete a picture as possible of the individual doing the Alpha or Beta testing.

Comments on the instructional material and course components were incorporated into reports to the COR (extract shown in appendix D).

(NOTE: This is the first page of an eight page form for collecting demographic data.)

ITTBBST FORMATIVE EVALUATION FORM

Last name _____ First Name _____ MI _____ Date _____

Local Tel # _____

Unit address _____ Unit Tel # _____

Check the year of your birth

☐78 ☐77 ☐76 ☐75 ☐74 ☐73 ☐72 ☐71 ☐70 ☐69 ☐68 ☐67
☐66 ☐65 ☐64 ☐63 ☐62 ☐61 ☐60 ☐59 ☐58 ☐57 ☐56 ☐55
☐54 ☐53 ☐52 ☐51 ☐50 ☐49 ☐48 ☐47 ☐46 ☐45 ☐44 ☐43

Check highest educational level completed

☐GED ☐12 ☐13 ☐14 ☐15 ☐16 ☐17 ☐18 ☐19 ☐20 ☐21 ☐22

Check baccalaureate degree(s) you have earned

<input type="checkbox"/> Biochemistry	<input type="checkbox"/> Biology	<input type="checkbox"/> Business Admin.	<input type="checkbox"/> Chemistry
<input type="checkbox"/> Civil Engineering	<input type="checkbox"/> Classical Languages	<input type="checkbox"/> Computer Science	<input type="checkbox"/> Early/Middle Education
<input type="checkbox"/> Educ. Psychology	<input type="checkbox"/> Electrical Engineering	<input type="checkbox"/> English	<input type="checkbox"/> Fine Arts
<input type="checkbox"/> Foreign Language Ed.	<input type="checkbox"/> Geography/Geoscience	<input type="checkbox"/> Health/Physical Ed.	<input type="checkbox"/> History
<input type="checkbox"/> Human Relations	<input type="checkbox"/> Humanities	<input type="checkbox"/> Industrial Engineering	<input type="checkbox"/> Information Science
<input type="checkbox"/> Justice Administration	<input type="checkbox"/> Linguistics	<input type="checkbox"/> Mathematics	<input type="checkbox"/> Mechanical Engineering
<input type="checkbox"/> Training/Development	<input type="checkbox"/> Philosophy	<input type="checkbox"/> Physiology/Biophysics	<input type="checkbox"/> Public Administration
<input type="checkbox"/> Secondary Education	<input type="checkbox"/> Sociology	<input type="checkbox"/> Systems Science/ORSA	<input type="checkbox"/> Urban/Public Affairs
<input type="checkbox"/> Other (specify) _____			<input type="checkbox"/> No baccalaureate degrees earned

Check advanced degree(s) you have earned

<input type="checkbox"/> Biochemistry	<input type="checkbox"/> Biology	<input type="checkbox"/> Business Admin.	<input type="checkbox"/> Chemistry
<input type="checkbox"/> Civil Engineering	<input type="checkbox"/> Classical Languages	<input type="checkbox"/> Computer Science	<input type="checkbox"/> Early/Middle Education
<input type="checkbox"/> Educ. Psychology	<input type="checkbox"/> Electrical Engineering	<input type="checkbox"/> English	<input type="checkbox"/> Fine Arts
<input type="checkbox"/> Human Relations	<input type="checkbox"/> Humanities	<input type="checkbox"/> Industrial Engineering	<input type="checkbox"/> Information Science
<input type="checkbox"/> Justice Administration	<input type="checkbox"/> Linguistics	<input type="checkbox"/> Mathematics	<input type="checkbox"/> Mechanical Engineering
<input type="checkbox"/> Training/Development	<input type="checkbox"/> Philosophy	<input type="checkbox"/> Physiology/Biophysics	<input type="checkbox"/> Public Administration
<input type="checkbox"/> Secondary Education	<input type="checkbox"/> Sociology	<input type="checkbox"/> Systems Science/ORSA	<input type="checkbox"/> Urban/Public Affairs
<input type="checkbox"/> Other (specify) _____			<input type="checkbox"/> No advanced degrees earned

Check your current component

☐Army (active) ☐ARNG ☐USAR ☐IRR (includes retired personnel)

Check year you entered basic active service

☐96 ☐95 ☐94 ☐93 ☐92 ☐91 ☐90 ☐89 ☐88 ☐87 ☐86 ☐85
☐84 ☐83 ☐82 ☐81 ☐80 ☐79 ☐78 ☐77 ☐76 ☐75 ☐74 ☐73
☐72 ☐71 ☐70 ☐69 ☐68 ☐67 ☐66 ☐65 ☐64 ☐63 ☐62 ☐61

If ARNG or USAR, check year you left active service (do not include drills)

☐96 ☐95 ☐94 ☐93 ☐92 ☐91 ☐90 ☐89 ☐88 ☐87 ☐86 ☐85
☐84 ☐83 ☐82 ☐81 ☐80 ☐79 ☐78 ☐77 ☐76 ☐75 ☐74 ☐73

If retired or separated, check year of retirement or separation

☐96 ☐95 ☐94 ☐93 ☐92 ☐91 ☐90 ☐89 ☐88 ☐87 ☐86 ☐85

Check current rank or last rank held before separation or retirement

☐GEN ☐LTG ☐MG ☐BG ☐COL ☐LTC ☐MAJ ☐CPT ☐1LT ☐2LT
☐CW5 ☐CW4 ☐CW3 ☐CW2 ☐WO1

(NOTE: This form used to evaluate pretest/post test for each subject.)

Doctrinal content of this subject Pretest/Posttest. Check the block that indicates your opinion for each question listed. A rating of 1 or 2 requires comments.

1. Tests no useful knowledge/would never ask this.
2. Tests minimal knowledge/would rarely ask this.
3. Tests good basic knowledge/might well ask this.
4. Tests advanced materials/would often ask this.
5. Tests complete and thorough knowledge/would always ask this.

Record your pretest and posttest scores for both the subject pretest and posttest as well as how long each test took. Place comments in the block to the right of each item.

Pretest: Score _____ Start Time _____		Posttest: Score _____ Start _____				
Time _____		Stop _____				
1.	2.	3.	4.	5.	Stop Time _____	Stop
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. _____	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2. _____	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3. _____	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4. _____	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5. _____	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6. _____	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7. _____	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8. _____	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9. _____	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10. _____	

(NOTE: This form used to evaluate lesson material; tailored for each lesson of each course.)

Doctrinal content of text and CBI. Check the block that indicates your opinion for each area listed (i.e. how closely the material matches approved doctrine such as FM's, ARTEPs, and AR's - there is a list of these references in your materials).

1. No useful knowledge/would never use/would need more information for every situation.
2. Minimal knowledge/would rarely use/would probably need more information for basic situations.
3. Good basic knowledge/could use for basic situations/may require more information for complex situations.
4. Advanced materials/suitable for entry level/standard use for normal function of job incumbent.
5. Complete and thorough knowledge/could use for all situations/would require no assistance for any situations.

Record start time and end time for each lesson. Remember that you will time how long it took to complete CBI and text materials separately. Place comments in the block to the right of each item and continue (if necessary) to the back of the page. Be sure to include the subject, lesson and topic number - i.e. 1A-1. When commenting on a lesson screen, use the number shown in the upper left corner of the screen to identify your comment. A rating of 1 or 2 requires comments.

Subject One - The Battalion Battlefield

Lesson Comments

Start Time ____ Stop ____

Time ____

Lesson 1A - Army Operations Doctrine

Reference read min. used: ____

Lesson Exam Score: ____ Take from next page after
taking the lesson exam!

TEXT lesson minutes used: ____

CBI lesson minutes used: NA

1. 2. 3. 4. 5.

- | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|---------------------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1A Objective _____ |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1A Introduction _____ |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1A 1. Structure of Modern Battlefield _____ |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1A 2. Principles of War _____ |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1A 3. Combat Power _____ |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1A 4. Tenets of Army Operations _____ |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1A 5. Maneuver Battalion Task Force Mission _____ |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1A Conclusion _____ |

(NOTE: This form used to evaluate lesson exam for each lesson.)

Doctrinal content of this lesson Exam. Check the block that indicates your opinion for each question listed.
A rating of 1 or 2 requires comments.

1. Tests no useful knowledge/would never ask this.
2. Tests minimal knowledge/would rarely ask this.
3. Tests good basic knowledge/might well ask this.
4. Tests advanced materials/would often ask this.
5. Tests complete and thorough knowledge/would always ask this.

Record your score for the lesson exam as well as how long the test took. Place comments in the block to the right of each item.

Score: Exam _____ Start Time _____ Stop Time _____

1. 2. 3. 4. 5.

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1. _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	2. _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3. _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	4. _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	5. _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6. _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	7. _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	8. _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	9. _____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	10. _____

(NOTE: This form used to evaluate value of course components.)

Please answer the following questions using the five point assessment scale shown below. Provide additional comments in the spaces provided. Questionnaires are identified by number only, so please be candid.

1. Strongly disagree.
2. Disagree.
3. Undecided.
4. Agree.
5. Strongly agree.

1. 2. 3. 4. 5.

- | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------------------------------------------------------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1. The doctrinal manuals provided were current. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2. The reading assignments were accurate as to chapter, annex, and so on in the manuals. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3. The reading assignments were appropriate. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4. Scenario based questions made the test more challenging. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5. The computer log-in procedures were easy to use. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6. The BSTS menus and controls (buttons, sliders, and mouse clicks) worked. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 7. I was able to control which lessons I took easily. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 8. The text portions of the course meshed well with the CBI portions. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 9. Navigation through the CBI portion of the course was easy. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 10. Audio quality was sufficient to clearly understand the narration. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 11. The workbook was easy to use. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 12. I did not have to wait for the computer to refresh the screen. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 13. The colors used for the on-screen text during the CBI lessons were easy to see. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 14. I had enough previous computer experience to complete the course when I arrived. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 15. The video CBI instruction was clear. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 16. The video CBI instruction played without dropping video frames (jerking picture). |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 17. The video CBI instruction played without dropping audio frames (jerking sound). |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 18. The videos were appropriate to the lessons. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 19. The pace of the course was right. |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 20. The level of the instruction was appropriate. |

Please rank order the following course components as to their educational/training value, with five being the most valuable. (Assign only one value to each.)

_____ Work book _____ Job Aids _____ References (FMs, etc.) _____ CBI _____ Exercises

What suggestions do you have for improving this instruction or method of presentation? Use additional sheets if necessary.

(NOTE: This form used to evaluate COMPS.)

Doctrinal content of this comprehensive exam. Check the block that indicates your opinion for each listed. A rating of 1 or 2 requires comments.

1. Tests no useful knowledge/would never ask this.
2. Tests minimal knowledge/would rarely ask this.
3. Tests good basic knowledge/might well ask this.
4. Tests advanced materials/would often ask this.
5. Tests complete and thorough knowledge/would always ask this.

1. 2. 3. 4. 5. QUINT#

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	19.	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	20.	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	21.	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	22.	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	23.	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	24.	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	25.	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	26.	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	27.	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	28.	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	29.	_____
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	30.	_____

APPENDIX C

BSTS Target Audience Description

The training audience, identified in the front-end analysis, consisted of 13 positions at each echelon. At battalion level there is a Chaplain, but no S5. At brigade, the Chaplain is combined with the S1 and the S5 is added. Note that not all brigades will have an S5 assigned; however, due to the increasing importance of Civil-Military Operations, the S5 course is included.

BN - BSTS Target Audience

Battalion Executive Officer - A Combat Arms (Infantry or Armor) Major or promotable Captain; having served as company commander, and a graduate of both the CAS³ and CGSC.

Adjutant (S1) - A Combat Arms Captain, branch qualified, and a graduate of OAC.

Intelligence Officer (S2) - A Military Intelligence Captain, branch qualified and a graduate of OAC.

Operations Officer (S3) - A Combat Arms Major, having commanded a company, branch qualified, and a graduate of CAS³ and CGSC.

S3 Air Officer (S3A) - A Combat Arms Captain, branch qualified, having completed OAC.

Logistics Officer (S4) - A Combat Arms Captain, branch qualified and having completed OAC.

Battalion Chaplain - An Army Chaplain, branch qualified.

Signal Officer - A Captain, Signal Corps, branch qualified, and having completed OAC.

Fire Support Officer - A Field Artillery Captain, branch qualified, and having completed OAC.

Engineer Officer - An Engineer Captain, branch qualified, and having completed OAC.

Chemical Officer - A LT, Chemical Corps, branch qualified, and having completed OBC.

Air Defense Artillery Officer - An Air Defense Artillery LT, branch qualified, and having completed OBC.

BDE - BSTS Target Audience

Brigade Executive Officer - A Combat Arms (Infantry or Armor) Lieutenant Colonel, branch qualified, and a graduate of CAS³ and CGSC.

Adjutant (S1) - A Combat Arms Major, branch qualified, and a graduate of OAC and CAS³.

Intelligence Officer (S2) - A Military Intelligence Major, branch qualified and a graduate of OAC and CAS³.

Operations Officer (S3) - A Combat Arms Major, branch qualified, and a graduate of CGSC.

S3 Air Officer (S3A) - An Infantry Captain, branch qualified, having completed CAS³.

Logistics Officer (S4) - A Quartermaster Corps Major, branch qualified and having completed CAS³.

Civil Affairs Officer (S5) - A Combat Arms Captain or Major, branch qualified, and having completed CAS³. (Note: The S5 is, normally, not authorized by TOE or MTOE except in the Ranger Regiment. The S5 is an augmentee to the existing MTOE.)

Signal Officer - A Signal Corps Captain, branch qualified, and having completed CAS³.

Fire Support Officer - A Field Artillery Major, having commanded a battery, branch qualified, and having completed CAS³.

Engineer Officer - An Engineer Corps Major, branch qualified and having completed CAS³.

Chemical Officer - A Chemical Corps Captain, branch qualified and having completed CAS³.

Air Defense Artillery Officer - An Air Defense Artillery LT, branch qualified, and having completed OBC.

APPENDIX D
Phase III - Beta - Sample Report Extract

(706) 682-4699

BDM/FTB-CRA-0504-97

January 01, 1997

U.S. Army Research Institute
Armored Forces Research Unit
ATTN: PERI-IK (Dr. Kathleen A. Quinkert)
Ft. Knox, Kentucky 40121-5620

Dear Dr. Quinkert:

The purpose of this letter is to provide you the Final results of the BETA Test conducted 15-30 May 1996 at Ft. Knox, Kentucky on the Brigade S5 Officer's course. This test was completed in compliance with the approved design document for contract MDA903-92-D-0075, delivery order 0041. The complete final beta test results are attached at the enclosure.

By way of an executive summary, the conclusions and recommendations derived from this test are as follows:

Conclusions:

The course of instruction was tested by one student who was representative of the target population, and one student who had no staff experience at either brigade or battalion. The tester who had had battalion and brigade staff experience was a civil affairs officer, however he also had ALPHA tested this course earlier. The time spent in CBI, as recorded by this tester, is not an accurate assessment of the time it takes the student to do the CBI. (There were three lessons for which zero time was logged for CBI; however, each of these three lesson examinations are conducted in CBI.) These circumstances diminish the value of the data collected.

The course of instruction meets the terminal learning objectives as measured by the percentage increase in examination scores from the pretest to posttest.

Dr. Kathleen A. Quinkert
BDM/FTB-CRA-00504-97
January 01, 1997
Page 2

The course of instruction meets the lesson training objectives as measured by the lesson examination scores meeting or exceeding the benchmark score in all but lesson 1A. In the case of lesson 1A, the civil affairs officer met the benchmark score, whereas the Captain of infantry did not meet the benchmark score.

Recommendations:

- That no further BETA testing be conducted.
- That research, follow-up, and revisions to the course of instruction be accomplished as stated at enclosure 3.
- That the final text be prepared and the final CD be cut.
- That future BETA test participants be screened more carefully to ensure they possess the prerequisite experience and MOS base to conduct a valid BETA test of the course.
- That care be taken to disallow an officer who has acted as the ALPHA tester for a course, so ensuring they did not BETA test the same course.

The above recommendations have been executed and are included in the final training support package that will be delivered for your approval.

Sincerely,

Charles R. Andre'
Director, Training and Information Systems

1 Enclosure

cc: Dr. B. Black, ARI
T. Lewman, BDM/Monterey
R. Sever, BDM/Ft. Knox

CRA/dmn

**BATTLE STAFF TRAINING SYSTEM
FINAL TESTING SUMMARY AND RECOMMENDATIONS
BRIGADE S5 COURSE 1 JANUARY 1997**

I. Target Population Demographics: This course is designed to prepare the newly assigned brigade S5 and for civil military operations at the brigade level. It is designed to train the S5 in matters concerning the civilian impact on military operations, and the political, economic, and social effects of military operations on a civilian population. Ordinarily, the brigade S5 will be a senior (promotable) Captain, or a Major. He should possess excellent staff cooperating and coordinating skills, and be able to work with host nation governments and special authorities.

A. Requested. The officers selected to BETA test this course should be senior Captains (promotable) or Majors. They should be branch qualified in one of the combat arms, graduates of basic and advance courses, and should have attended the combined arms and services staff school. They should have experience as platoon leaders, company commanders, and battalion or brigade staff officers.

B. Actual. The two officers selected to BETA test this course differed widely in demographics. One officer was a Captain of Infantry, age 36, with ten years active duty service, and a graduate of The Combined Arms and Services Staff School. All his experience had been at company level. He has participated in three rotations at the national training center, and has no combat experience. The other officer, a Lieutenant Colonel of Civil Affairs, age 44, with twenty-one years in the service, is now a civil affairs officer, branch trained, who has attended engineer, military police, civil affairs, and special operations forces advance courses, and the resident command and general staff officer course. His combat experience was in Bosnia, and he has no combat training center experience. He has served as special operations forces cadre at the joint readiness training center.

C. Target Population Summary. One of the two officers was representative of the target population. The Lieutenant Colonel, Civil Affairs, is the same officer who Alpha tested this course. Because of the pre-test (Alpha) bias of one of the testers, and the lack of experience of the other, the resulting data are considered inadequate and partially contaminated. These circumstances diminish the value of the test data.

II. Instructional Results. (Note: The following times and scores are averages from the population sample.)

A. The course consists of four basic activities; diagnostic testing, reading (study materials and text lessons), computer-based instruction, and achievement testing. Each of the BETA test students was asked to record his scores on all examinations, and to keep track of the actual time spent in negotiating the examinations, text lessons and computer based instruction. The results of these four activities were analyzed, and the results are as follows:

B. Pre/post test: The subject tests were used as both diagnostic and achievement tests. Scores on the pretests were compared with those on the posttests to determine the differences between the two scores, and to indicate whether or not the students had met the standard. The results of this comparison are shown in Table 1.

PRE/POST TEST COMPARISON (N=2)				
SUBJECT	PRETEST	FINAL EXAM	% DIFFERENCE	STANDARD MET?
1.Civil Affair Operations	75%	94%	25.50%	YES
2.The Brigade S5	72%	79%	9.72%	NO

Table 1

C. Lesson Examinations: Results of lesson examinations are displayed at Table 2.

LESSON EXAM SUMMARY (N=2)		
LESSON	SCORE	STANDARD MET?
1A Civil Affairs Overview	73.00	NO
1B Psychological Operations Overview	92.00	YES
1C Enemy Prisoners of War & Civilians	80.00	YES
2A The Brigade S5 Responsibilities	90.00	YES
2B Staff Integration	80.00	YES
2C Establishing a Dislocated Civ Ctr	100.00	YES

Table 2

D. Comprehensive Examination. The average score on the end of course comprehensive examination was 70.50. The officer who made the lower score reported study time of eleven hours for text, and four hours for doctrine. His study time notwithstanding, his lack of experience may have placed him at a disadvantage in this case.

E. BETA Test Comments.

1. Subjective Comments. Subjective comments are at Enclosure 3

2. Structured Post-Course Comments. Structured comments indicate that the course is a good, solid entry level course. That is to say, that after the student finishes this course, he or she could go to a brigade and fulfill the duties of the brigade S5.

F. Course Length Summary:

1. Time to Complete:

TEXT:	13.67
DOCTRINE:	2.83
<u>CBI:</u>	<u>4.28</u>
	20.78 Hours

2. Analysis of student-reported times.

(a) Text Lesson Reading Times. The Course Time Analysis, shows that the students did not read the full text. Indications are that they went right to the examination and "gamed" their way through the course, instead of attempting to accomplish the performance objectives set forth in the course front matter. This may account, in part, for the relatively low average score on the end of course comprehensive test.

(b) Doctrinal Publication Reading Times. Of a total of approximately 42 hours (calculated at 12 pages per hour) of doctrinal reference reading requirements, the students averaged slightly less than seven hours, or approximately 17%. This number represents unique reading requirements (if a reference was required by lesson 1A and 1B, for example, the number of pages was included only once in the total page count.) This is becoming a trend - students either cannot or will not read the doctrinal requirements.

(c) Computer-Based Instruction. The average time spent in computer-based instruction was 4.28 hours. This includes all lessons, pretests and posttests, and the end of course comprehensive test. The analysis of CBI time indicates little or no time spent in CBI by tester number two. Either there are some inaccuracies in his own record keeping, or he did not do the examinations for lessons 1b, 1c, and 2b. Zero time is recorded for these lessons. In lessons 2A and 2C, both of which contain CBI instructional material, he recorded five minutes and twenty minutes respectively. The CBI data for tester number two was ignored in calculating the CBI time for the course.

III. Conclusions and Recommendations.

A. Conclusions:

1. The course of instruction was tested by one student who was representative of the target population, and one student who had no staff experience at either brigade or battalion. The tester who had had battalion and brigade staff experience was a civil affairs officer, however he also had ALPHA tested this course earlier. The time spent in CBI, as recorded by this tester, is not an accurate assessment of the time it takes the student to do the CBI. (There were three lessons for which zero time was logged for CBI; however, each of these three lesson examinations are conducted in CBI.) These circumstances diminish the value of the data collected.

2. The course of instruction meets the terminal learning objective as measured by the percentage increase in exam scores from the pretest to posttest.

3. The course of instruction meets the lesson training objectives as measured by the lesson examination scores meeting or exceeding the benchmark score in all but lesson 1A. In the case of lesson 1A, the civil affairs officer met the benchmark score, whereas the Captain of infantry did not meet the benchmark score.

B. Recommendations:

1. That the COR approve the exclusion of the CBI data from tester number two, and that only the CBI data from tester number one be used for the purpose of determining the length of time required to accomplish the CBI in the course.

2. That no further BETA testing be conducted.

3. That research, follow-up, and revisions to the course of instruction be accomplished as stated at Enclosure 3.

4. That the final text be prepared and the final CD be cut.

5. That future BETA test participants be screened more carefully to ensure they possess the prerequisite experience and MOS base to conduct a valid BETA test of the course.

6. That care be taken to disallow an officer who has acted as the ALPHA tester for a course to BETA test the same course.

Enclosure 1, Post Course Structured Comments

The Beta Test packets contain a rating sheet for each lesson. Each topic in the lesson is rated on a scale of one to five, with five being the highest value assigned to the material under test. The topics are rated as to their value in enabling the student to perform the duties of the brigade S5 as they pertain to that particular subject and lesson.

Score 1 - No useful knowledge. Would need more information for every situation encountered on the job.

Score 2 - Minimal knowledge/would rarely use/would probably need more information for basic situations.

Score 3 - Good basic knowledge/could use for basic situations/may require more information for complex situations.

Score 4 - Advanced materials/suitable for entry level/standard use for normal function of job incumbent.

Score 5 - Complete and thorough knowledge/could use for all situations/would require no assistance for any situation.

Enclosure 2, Subject and Lesson Summary for Brigade S5 Officer Beta Test

Subject 1 - Civil Affair Operations

TIME: (Hours)

TEXT: 4.04
DOCTRINE: 2.67
CBI: 1.90
8.61 Hours

Examination Scores:

PRETEST: 75%
POSTTEST: 94%

LESSON EXAM 1A: 73.00%
LESSON EXAM 1B: 92.00%
LESSON EXAM 1C: 80.00%

Subject 2 - The Brigade S5

TIME: (Hours)

TEXT: 2.79
DOCTRINE: 0.17
CBI: 2.15
5.11 Hours

Examination Scores:

PRETEST: 72%
POSTTEST: 79%

LESSON EXAM 2A: 90.00%
LESSON EXAM 2B: 80.00%
LESSON EXAM 2C: 100.00%

Enclosure 3, Brigade S5 Officer Beta Tester Formative Evaluation

[NOTE: C = Check/research the state doctrinal/
grammatical error and either fix or,
if not required, report detailed rationale
to PM with documentation.

F = Fix

C/F = Check then Fix

? = Unsure of issue, research

N/A = No action required]

SUBJECT ONE - CIVIL AFFAIRS OPERATIONS

Lesson 1 Pre-Test

Question # 10 - Sentence missing "range" from "short-range" word.

Response: Question corrected.

Question #19 - The last sentence gives the answer away. Also "awide" should be two words.

Response: Question rewritten for clarity

Lesson 1A - Civil Affairs Overview

When I finished with Lesson 1A the book did not tell me to go to the computer.

Response: No change. All lessons are standardized. Student failed to follow instructions from Student Text.

Course intro. has graphic image only.

Response: Narration added.

Intro. subject graphic says "Civil Affair". Needs to read "Civil Affairs".

Response: Slide replaced.

Audio on intro. uses "Civil Affair". Needs to say "Civil Affairs".

Response: Narration corrected.

Introduction Para 2A First paragraph include in CA mission, minimize civilian interference with military operations.

Response: Corrected. Included verbiage to definition.

PRACTICAL EXERCISE

S5 PE2C-18 Wrong symbol.

Response: No change. Could not replicate exact graphic IAW FM 101-5-1.

S5 PE2C-25 No replay button.

Response: Fixed.

On exercise 170 is not necessarily correct.

UNACCOM Males 158 = 23 tents

UNACCOM Females 35 = 5 tents

UNACCOM CIMCD 20 = 3+ tents

Family 987 = 141+ tents

mess, process, med 6 tents = 178 tents total.

Plus 10% to insure families are not overcrowded or split up 10 tents. Simple book calculations are below minimum. Realistic 188 tents minimum.

Response: No change. Student was asked to identify minimum requirement for billeting only. 170 is the correct answer.

One iteration of problem states 158 males next 150 males, changes requirement by 2 tents.

Response: Typographical error corrected.

On barbed wire calculations you determine the number of 300 meter 3 sections you are dealing with and then how much wire do not interpolate 1500 meters = 9, 300 meter sections. 9 times 6 is 54 reels unless wood pickets are used then 63 reels.

Response: No change. Question formula is correct as stated IAW FM 101-10-1/2.

As a point of information both the UNITCR and the IRR have handbooks on camp development, construction, and operation. It would be best to use them since they will most likely be present, you will be getting resources from them, and you will want their assistance as much as possible. So do it their way. They have also probably done it before, you probably haven't.

Response: No change. Recent examples of operations other than war (OOTW), notably Operation *Provide Comfort*, have indicated that combat brigades and even subordinate battalions may be tasked to provide peacekeeping or humanitarian assistance. In preparing for this lesson, interviews were conducted with bat-talion-level officers who were responsible for the management of dislocated civilian during Operation *Provide Comfort*. As a result, this lesson was written as an introduction to establishing a dislocated civilian camp. It is designed as a common sense approach for a non-civil affairs unit tasked with developing a camp.

Question #15 - Why waste time asking questions like this?

Response: No change. The question concerns animal control, particularly in a Third World environment. This is a critical health and planning consideration.

Need to ask questions that apply to real life scenarios.

Response: No change. Both Lesson 2C and its accompanying practical exercise were based on a given scenario, Operation *Provide Comfort*.

Give the user the alternative to select screen colors.

Response: No change. Screen background has been standardized.

Check dislocated civilian section.

Response: No change. Lesson 2C was reviewed for accuracy.

COMPREHENSIVE END OF EXAM (COMPS)

D3F98F (3) Don't know, the order that I was given for this BETA TEST had little S5, CA, PSYOP.

Response: No change. Question does not refer to a specific OPORD, nor is one required to answer the question.

D3O4M (5) Scored incorrect but feedback say "Tactical Planning Team".

Response: No change. Correct answer is indicated and scored properly.

D3E49E (10) Get rid of this question, does not make sense.

Response: Question deleted.

D3E49E (10) Not an S5 responsibility, "S5 has no business being there".

Response: Question deleted.

APPENDIX E

Final Research Report Data

1. Throughout Beta testing, testers recorded the time they spent studying the various course components. The reading time for text based lessons shown in the following chart was computed based on the estimated time to read the Student Workbook lessons at 12 pages per hour. Since reading time will vary between students depending on their experience, and reading abilities, this estimated value is provided to anticipate the amount of time a student might need to complete a course of instruction. (Actual student reading time is addressed in a subsequent chart.) The CBI study time was computed based on the average actual time spent by Beta testers studying the CBI material and completing the exams. According to student reported information, many testers did not read any doctrinal material for the lessons. Based on student experience and proficiency level, the amount of time needed to study doctrine to ensure entry level skills for a course will vary significantly. This chart does not include any time for reading doctrinal material.

STUDY TIME (HOURS)

COURSE	TEXT	CBI
BRIGADE COURSES		
Common Core	13	18.1
Commander	34	33.7
Executive Officer	17	10.2
S1 Officer	13	9.4
S2 Officer	10	13.5
S3 Officer	12	13.2
S4 Officer	16	12.2
S5 Officer	14	6.2
S3 Air Officer	8	11.5
Fire Support Officer	20	8.8
Air Defense Officer	8	12.2
Signal Officer	3	4.4
Chemical Officer	8	8.3
Asst. Brigade Engineer	11	11.2
TOTAL	187	172.9
BATTALION COURSES		
Common Core	9	7.6
Commander	26	20.3
Executive Officer	16	10.1
S1 Officer	13	9.6
S2 Officer	7	13.7
S3 Officer	9	6.4
S4 Officer	15	7.2
Chaplain	5	2.2
S3 Air Officer	6	10.9
Fire Support Officer	19	6.3
Air Defense Officer	8	5.1
Signal Officer	4	5.1
Chemical Officer	9	9.1
Engineer Officer	8	7.6
TOTAL	154	121.2

2. The following chart shows the number of lessons contained in the ITTBBS-BSTS courses. The column for "TEXT" means the lesson material is entirely text-based, except for the lesson exam. The exam for every lesson in every course is contained in CBI. The "CBI" column means the lesson is entirely CBI-based, unless the student reads doctrinal reference material. The column labeled "TEXT/CBI" means part of the lesson is text-based and part of the lesson is CBI-based (either tutorial or practical exercise.)

NUMBER OF LESSONS

COURSE	TEXT	CBI	TEXT/CBI	TOTAL
BRIGADE COURSES				
Common Core	6	5	0	11
Commander	6	4	7	17
Executive Officer	7	0	4	11
S1 Officer	8	0	3	11
S2 Officer	4	8	1	13
S3 Officer	6	4	1	11
S4 Officer	6	0	3	9
S5 Officer	4	0	2	6
S3 Air Officer	4	6	0	10
Fire Support Officer	6	0	6	12
Air Defense Officer	3	3	1	7
Signal Officer	2	2	0	4
Chemical Officer	4	2	1	7
Asst. Brigade Engineer	4	2	4	10
TOTAL	70	36	33	139
BATTALION COURSES				
Common Core	6	5	0	11
Commander	2	4	9	15
Executive Officer	5	0	6	11
S1 Officer	8	0	3	11
S2 Officer	3	7	1	11
S3 Officer	6	2	1	9
S4 Officer	5	0	4	9
Chaplain	3	0	1	4
S3 Air Officer	4	0	6	10
Fire Support Officer	6	0	6	12
Air Defense Officer	3	2	1	6
Signal Officer	3	2	0	5
Chemical Officer	3	0	4	7
Engineer Officer	3	1	4	8
TOTAL	60	23	46	129

3. Each of the subjects within each of the courses contains a pretest which the student must complete in order to receive credit for the course within the training management system and be allowed to take the lesson exams. A post test is provided at the end of each subject. Scores in the below chart were computed by averaging all subject test scores, for all Beta testers, for all Subjects within the designated course. The "improvement" is the difference between the pretest and post test scores.

PRETEST/POST TEST IMPROVEMENT

COURSE	PRETEST	POST TEST	IMPROVEMENT
BRIGADE COURSES			
Common Core	76	92	16
Commander	79	95	16
Executive Officer	65	89	24
S1 Officer	73	92	19
S2 Officer	74	86	12
S3 Officer	70	89	19
S4 Officer	65	95	30
S5 Officer	73	86	13
S3 Air Officer	57	94	37
Fire Support Officer	81	95	14
Air Defense Officer	59	85	26
Signal Officer	58	92	34
Chemical Officer	57	82	25
Asst. Brigade Engineer	73	93	20
AVERAGE	68	90	22
BATTALION COURSES			
Common Core	82	92	10
Commander	71	88	17
Executive Officer	73	90	17
S1 Officer	62	92	30
S2 Officer	59	88	29
S3 Officer	68	93	25
S4 Officer	66	88	22
Chaplain	74	91	17
S3 Air Officer	62	91	29
Fire Support Officer	77	93	16
Air Defense Officer	69	94	25
Signal Officer	64	91	27
Chemical Officer	71	94	23
Engineer Officer	72	94	22
AVERAGE	70	91	21

4. Every lesson in every subject of every course contains a lesson exam that is CBI-based. Scores in this chart were computed by averaging all lesson exam scores, for all Beta testers, for all lessons within the designated course.

LESSON EXAM SCORES

COURSE	EXAM SCORES
BRIGADE COURSES	
Common Core	93
Commander	92
Executive Officer	85
S1 Officer	89
S2 Officer	85
S3 Officer	88
S4 Officer	88
S5 Officer	86
S3 Air Officer	93
Fire Support Officer	92
Air Defense Officer	87
Signal Officer	91
Chemical Officer	87
Asst. Brigade Engineer	88
AVERAGE	89
BATTALION COURSES	
Common Core	89
Commander	80
Executive Officer	91
S1 Officer	92
S2 Officer	81
S3 Officer	89
S4 Officer	84
Chaplain	90
S3 Air Officer	85
Fire Support Officer	86
Air Defense Officer	92
Signal Officer	92
Chemical Officer	93
Engineer Officer	89
AVERAGE	87

5. A CBI-based, comprehensive exam is provided at the end of each course. Scores in this chart were computed by averaging all Comprehensive exam scores, for all Beta testers within the designated course.

COMPREHENSIVE EXAM SCORES

COURSE	EXAM SCORE
BRIGADE COURSES	
Common Core	74
Commander	70
Executive Officer	66
S1 Officer	74
S2 Officer	66
S3 Officer	78
S4 Officer	76
S5 Officer	71
S3 Air Officer	78
Fire Support Officer	76
Air Defense Officer	77
Signal Officer	74
Chemical Officer	79
Asst. Brigade Engineer	58
AVERAGE	73
BATTALION COURSES	
Common Core	75
Commander	66
Executive Officer	73
S1 Officer	71
S2 Officer	59
S3 Officer	69
S4 Officer	85
Chaplain	84
S3 Air Officer	74
Fire Support Officer	66
Air Defense Officer	78
Signal Officer	82
Chemical Officer	80
Engineer Officer	83
AVERAGE	75

6. Throughout Beta testing, testers recorded the time they spent studying the various course components. The estimated text hours was computed based on the time to read the Student Workbook text-based lessons at 12 pages per hour. The actual text hours was computed by averaging the actual time spent reading the lessons, as recorded by Beta testers. Actual reading time is expected to vary between students based on experience level and reading abilities. However, some students did not read selected text-based lessons. The actual text reading time is about one third of the estimated text reading time averaged over all courses. The estimated doctrine hours was computed based on the time to read the Required Reading sources listed with each lesson at 12 pages per hour. Where sections of doctrinal references were listed as Required Reading in more than one lesson, the reading time was only counted once. The actual doctrine reading hours was computed by averaging the actual time spent reading the doctrinal references, as recorded by Beta testers. Actual doctrine reading time is expected to vary between students based on experience level and reading abilities. However, several students did not read doctrinal references for most of the lessons. Averaged over all Beta testers for all courses, the students spent only about 3 percent of the time estimated for reading doctrinal references. This equates to an average of about 50 minutes per student per course.

READING TIMES (hours)

	TEXT	TEXT	DOCTRINE	DOCTRINE
COURSE	ESTIMATED	ACTUAL	ESTIMATED	ACTUAL
BRIGADE COURSES				
Common Core	13	3.1	93	1.5
Commander	34	12.6	170	1.1
Executive Officer	17	5.2	75	1.3
S1 Officer	13	4.2	53	4.4
S2 Officer	10	2	91	6.4
S3 Officer	12	3.7	103	2.1
S4 Officer	16	9.2	44	6.5
S5 Officer	14	8.8	43	2.8
S3 Air Officer	8	3.1	60	2.6
Fire Support Officer	20	3.5	108	2.8
Air Defense Officer	8	4.1	72	8.3
Signal Officer	3	1.7	35	1.6
Chemical Officer	8	2.5	38	1.5
Asst. Brigade Engineer	11	4.3	121	5.1
BATTALION COURSES				
Common Core	9	2.1	92	0.4
Commander	26	7.3	163	5.2
Executive Officer	16	5.3	74	0.1
S1 Officer	13	8.9	48	0.7
S2 Officer	7	2.3	63	0.2
S3 Officer	9	2	63	0.2
S4 Officer	15	5	39	3.3
Chaplain	5	1.3	33	0
S3 Air Officer	6	2.7	74	0
Fire Support Officer	19	2.3	145	0.8
Air Defense Officer	8	1.7	63	2.1
Signal Officer	4	1.3	44	0.3
Chemical Officer	9	2.5	27	1.7
Engineer Officer	8	4	106	3.3

7. At the completion of each Subject for each course, the students were asked to rank order the course components as to their educational/training value. The columns in the below chart represent the course components:

- Workbook: Student Workbook text lessons.
- Job Aids: Checklists and guides contained in the back of the Student Workbook, that can be reproduced and used by staff officers to assist them in the performance of their duties.
- References: Doctrinal publications listed as Required Reading for each of the lessons.
- CBI: Computer-based training material (tutorials and practical exercises).
- Exercises: Subject, lesson, and COMPS exams.

The numbers in this chart were computed by averaging the ratings based on the assessment by all Beta testers within the designated course. In this chart "1" means the most valuable and "5" means the least valuable

STUDENT ASSESSMENT OF COURSE COMPONENTS

	WORKBOOK	JOB AIDS	REFERENCES	CBI	EXERCISES
COURSE					
BRIGADE COURSES					
Common Core	1	5	3	2	4
Commander	1	5	4	2	3
Executive Officer	1	5	4	2	3
S1 Officer	2	5	4	1	3
S2 Officer	3	5	2	1	4
S3 Officer	2	5	3	1	4
S4 Officer	5	3	2	1	4
S5 Officer	(Not	Rated	By	Testers.)	
S3 Air Officer	2	4	5	1	3
Fire Support Officer	2	3	1	4	5
Air Defense Officer	3	5	4	1	2
Signal Officer	1	3	5	4	2
Chemical Officer	1	4	5	3	2
Asst. Brigade Engineer	5	2	4	3	1
TOTAL (Lowest is best)	29	54	46	26	40
BATTALION COURSES					
Common Core	1	5	4	2	3
Commander	2	5	4	1	3
Executive Officer	1	5	4	2	3
S1 Officer	2	3	5	1	4
S2 Officer	2	4	5	1	3
S3 Officer	3	5	4	1	2
S4 Officer	5	1	2	4	3
Chaplain	1	5	3	2	4
S3 Air Officer	2	4	1	3	5
Fire Support Officer	2	5	1	3	4
Air Defense Officer	2	3	5	4	1
Signal Officer	1	4	2	3	5
Chemical Officer	1	5	2	3	4
Engineer Officer	2	5	3	1	4
TOTAL (Lowest is best)	27	59	45	31	48

APPENDIX F

Review of Related Research

Previous Advanced Research Projects Agency (ARPA) and ARI projects have directly attacked the battlestaff competency issue. The first project, by the Infantry Forces Research Unit, produced the *Commander's Battle Staff Handbook* (Pleban, Thompson, & Valentine, 1993) which serves as an interim solution to staff individual training and synchronization issues. It is a description of individual staff position duties, responsibilities, and references that is being distributed to the Reserve Components (RC) and Active Components (AC).

The second project was ARPA sponsored under the program umbrella of Simulation In Training for Advanced Readiness (SIMITAR). Applying the *Commander's Battle Staff Handbook* as the start point of the TD process, BN-BSTS for Army National Guard (ARNG) Units was developed and delivered to the ARI in January 1995. Likewise, applying the *Brigade Commander's Battle Staff Handbook* (André, & Valentine, 1996) led to the development of BDE-BSTS, delivered to ARI in January 1996. These programs focused on the development of prototype battlestaff officer training programs to be available to ARNG officers at home or in the armory. These multimedia prototype training programs have been distributed to the two ARNG test brigades selected for training at the NTC in 1996-1997. Portions are also in use by the US Army Infantry School, the US Army Armor School, and the US Army Aviation Center. The CSS Battle Staff Training System (CSS-BSTS) developed for the ARNG used the approach designed for BN and BDE-BSTS to develop required battlestaff training for the Forward Support Battalion (FSB) of the divisional and separate brigade.

The applicable successes and lessons learned from the BN-BSTS, BDE-BSTS, CSS-BSTS as well as the parent program, SIMITAR, and the family of collective training programs (SIMBART, SIMUTA, and COBRAS) were all studied in the course of the ITTBBS-BSTS project. The Center for Army Lessons Learned (CALL) publications were essential, since they contained lessons learned from reports, data, and observations, both from combat operations and from CTC After Action Reviews (AAR). Additionally, the wealth of knowledge and information available from the CTC Operations Groups, at both the NTC and JRTC, as well as the subject matter experts (SMEs) at Ft. Leavenworth's Battle Command Training Directorate (BCTD) and Battle Command Battle Lab (BCBL) were tapped to enhance the existing BSTS training programs for ITTBBS-BSTS. These information sources, in conjunction with existing doctrinal publications and Tactics, Techniques, and Procedures (TTP) were integrated into the TSPs for battalion and brigade commanders and their staff officers.

APPENDIX G

Hardware and Software to Operate BSTS

HARDWARE (installed and configured):

- 486 DX2 Computer, with 66 MHZ processor
- 8 Mb RAM, expandable to 32+Mb; 70ns or better
- 200 Mb Hard Disk, or better
- 16 bit local bus
- 101 Key Enhanced Keyboard
- Desktop cabinet
- Serial Mouse with driver
- Sound Blaster 16 Sound board, or compatible, with driver and speakers
- 105K/300K double spin CD-ROM or better
- 3-1/2", 1.44 Mb disk drive
- Spider Graphics accelerator card, or equivalent, with driver to handle 640x480, 256 color and 14-17" monitor, 1MB RAM or better
- 14-15" monitor, .28 dpi

EITHER THE BELOW LISTED MODEM (WAN) OR ETHERNET CARD
(LAN)

(not required for stand-alone mode.)

- 9600 bps, or better, modem with 10BT RJ45 connector
- Ethernet card with connector to meet LAN configuration requirements

SOFTWARE (installed and configured):

- DOS 6.21
- Windows for Workgroups 3.11w/Video for Windows
- Icon Author Present 7.0
- EMMii student software

ACCESSORIES

- Surge Strip
- 10BT/RJ45 modular plug with 10' cable (WAN)
- Mouse Pad